COLUMBIA LIBRARIES OFFSITE
HEALTH SCIENCES RESTRICTED
HR00875058

Serial
A
v.23-24
1883-84
cop. 1

Columbia University
in the City of New York
School of Dental and Oral Surgery

LIBRARY OF
DR. CARL F. W. BÖDECKER
1846-1912
The gift of
Dr. Henry and Dr. Charles Bödecker
1929

Digitized by the Internet Archive
in 2014

https://archive.org/details/transactionsofam2324amer

TRANSACTIONS

OF THE

AMERICAN DENTAL ASSOCIATION

AT THE

TWENTY-THIRD ANNUAL SESSION,

HELD AT NIAGARA FALLS,

COMMENCING ON THE 7TH OF AUGUST, 1883.

PUBLICATION COMMITTEE:

GEO. H. CUSHING, A. W. HARLAN, S. G. PERRY.

PHILADELPHIA:
THE S. S. WHITE DENTAL MANUFACTURING CO.
1884.

DISCLAIMER.

The American Dental Association, although formally accepting and publishing the reports of the various Standing Committees and the essays read before the Association, holds itself wholly irresponsible for the opinions, theories, or criticisms therein contained, except when otherwise decided by special resolution.—*Constitution.*

PRESS OF PATTERSON & WHITE,
PHILADELPHIA.

LIST OF OFFICERS FROM DATE OF ORGANIZATION.

PRELIMINARY CONVENTION, NIAGARA FALLS, AUGUST, 1859.

President,	W. W. ALLPORT . . .	Chicago.
Secretary,	J. TAFT	Cincinnati.

ORGANIZATION AND FIRST SESSION OF ASSOCIATION, WASHINGTON, D. C., JULY, 1860.

[Annual meetings to be hereafter last Tuesday in July.]

President,	W. H. ATKINSON . . .	Cleveland.
1st Vice-President,	J. B. GIBBS	Washington, D. C.
2d Vice-President,	W. CAHOON	Detroit, Mich.
Recording Secretary,	J. TAFT	Cincinnati.
Corresponding Secretary,	W. MUIR ROGERS . . .	Shelbyville, Ky.
Treasurer,	S. DILLINGHAM . . .	Philadelphia.

[NO MEETING IN 1861.]

CLEVELAND, JULY, 1862.

President,	GEO. WATT	Xenia, Ohio.
1st Vice-President,	W. H. ALLEN . . .	New York City.
2d Vice-President,	W. D. STONE . . .	Lexington, Ky.
Recording Secretary,	J. TAFT	Cincinnati.
Corresponding Secretary,	J. F. JOHNSTON . . .	Indianapolis.
Treasurer,	W. A. PEASE . . .	Dayton, Ohio.

PHILADELPHIA, JULY, 1863.

President,	W. H. ALLEN . . .	New York City.
1st Vice-President,	J. H. MCQUILLEN . .	Philadelphia.
2d Vice-President,	WM. B. HURD . . .	Brooklyn, N. Y.
Recording Secretary,	J. TAFT	Cincinnati.
Corresponding Secretary,	C. R. BUTLER . . .	Cleveland.
Treasurer,	A. C. HAWES . . .	New York City.

NIAGARA FALLS, JULY, 1864.

President,	J. H. MCQUILLEN . .	Philadelphia.
1st Vice-President,	C. P. FITCH	New York City.
2d Vice-President,	H. BENEDICT	Detroit.
Recording Secretary,	J. TAFT	Cincinnati.
Corresponding Secretary,	GEO. W. ELLIS . . .	Philadelphia.
Treasurer,	I. J. WETHERBEE . . .	Boston.

Chicago, July, 1865.

President,	C. W. Spalding . . .	St. Louis.
1st Vice-President,	Geo. H. Cushing . . .	Chicago.
2d Vice-President,	Jas. McManus . . .	Hartford.
Recording Secretary,	J. Taft	Cincinnati.
Corresponding Secretary,	L. D. Shepard . . .	Boston.
Treasurer,	I. J. Wetherbee . . .	Boston.

Boston, July, 1866.

President,	C. P. Fitch	New York City.
1st Vice-President,	W. H. Morgan . . .	Nashville.
2d Vice-President,	L. D. Shepard . . .	Boston.
Recording Secretary,	J. Taft	Cincinnati.
Corresponding Secretary,	A. Hill	Norwalk, Conn.
Treasurer,	W. W. Sheffield . .	New London, Conn.

Cincinnati, July,* 1867.

President,	A. Lawrence . . .	Lowell, Mass.
1st Vice-President,	P. G. C. Hunt . . .	Indianapolis, Ind.
2d Vice-President,	A. S. Talbert . . .	Lexington, Ky.
Recording Secretary,	J. Taft	Cincinnati.
Corresponding Secretary,	C. R. Butler . . .	Cleveland.
Treasurer,	W. H. Goddard . . .	Louisville, Ky.

Niagara Falls, July, 1868.

President,	Jonathan Taft . . .	Cincinnati.
1st Vice-President,	Homer Judd	St. Louis.
2d Vice-President,	A. A. Blount . . .	Springfield, Ohio.
Recording Secretary,	Edgar Park	St. Louis.
Corresponding Secretary,	Jas. McManus . . .	Hartford.
Treasurer,	W. H. Goddard . . .	Louisville.

Saratoga Springs, August, 1869.*

President,	Homer Judd	St. Louis.
1st Vice-President,	S. J. Cobb	Nashville.
2d Vice-President,	C. E. Francis . . .	New York City.
Recording Secretary,	M. S. Dean	Chicago.
Corresponding Secretary,	I. A. Salmon . . .	Boston.
Treasurer,	W. H. Goddard . . .	Louisville.

* Owing to a change in the Constitution, officers elected at this and the sessions following served at the next annual meeting subsequent to their election, and the sessions of and after 1869 commenced on the first Tuesday in August.

NASHVILLE, AUGUST, 1870.

President,	W. H. MORGAN . . .	Nashville.
1st Vice-President,	S. W. DENNIS . . .	San Francisco.
2d Vice-President,	J. R. WALKER . . .	New Orleans.
Recording Secretary,	M. S. DEAN	Chicago.
Corresponding Secretary,	I. A. SALMON . . .	Boston.
Treasurer,	W. H. GODDARD . . .	Louisville.

WHITE SULPHUR SPRINGS, VA., AUGUST, 1871.

President,	GEO. H. CUSHING . . .	Chicago.
1st Vice-President,	C. E. FRANCIS . . .	New York City.
2d Vice-President,	J. R. WALKER . . .	New Orleans.
Recording Secretary,	M. S. DEAN	Chicago.
Corresponding Secretary,	I. A. SALMON . . .	Boston.
Treasurer,	W. H. GODDARD . . .	Louisville.

NIAGARA FALLS, AUGUST, 1872.

President,	P. G. C. HUNT . . .	Indianapolis.
1st Vice-President,	L. D. SHEPARD . . .	Boston.
2d Vice-President,	G. A. MILLS	Brooklyn, N. Y.
Recording Secretary,	M. S. DEAN	Chicago.
Corresponding Secretary,	J. TAFT	Cincinnati.
Treasurer,	W. H. GODDARD . . .	Louisville.

PUT-IN-BAY, AUGUST, 1873.

President,	T. L. BUCKINGHAM . .	Philadelphia.
1st Vice-President,	ISAIAH FORBES . . .	St. Louis.
2d Vice-President,	A. F. MCLAIN . . .	New Orleans.
Recording Secretary,	M. S. DEAN	Chicago.
Corresponding Secretary,	J. TAFT	Cincinnati.
Treasurer,	W. H. GODDARD . . .	Louisville.

DETROIT, AUGUST, 1874.

President,	M. S. DEAN	Chicago.
1st Vice-President,	GEO. W. KEELY . . .	Oxford, Ohio.
2d Vice-President,	J. S. KNAPP	New Orleans.
Recording Secretary,	C. STODDARD SMITH . .	Springfield, Ill.
Corresponding Secretary,	GEO. L. FIELD . . .	Detroit.
Treasurer,	W. H. GODDARD . . .	Louisville.

NIAGARA FALLS, AUGUST, 1875.

President,	A. L. NORTHROP . . .	New York City.
1st Vice-President,	H. J. MCKELLOPS . .	St. Louis.
2d Vice-President,	H. A. SMITH	Cincinnati.
Recording Secretary,	C. STODDARD SMITH . .	Springfield, Ill.
Corresponding Secretary,	J. H. MCQUILLEN . .	Philadelphia.
Treasurer,	W. H. GODDARD . . .	Louisville.

PHILADELPHIA, AUGUST, 1876.

President,	GEO. W. KEELY . . .	Oxford, Ohio.
1st Vice-President,	C. N. PEIRCE . . .	Philadelphia.
2d Vice-President,	CORYDON PALMER . . .	New York City.
Recording Secretary,	C. STODDARD SMITH . .	Springfield, Ill.
Corresponding Secretary,	J. H. MCQUILLEN . .	Philadelphia.
Treasurer,	W. H. GODDARD . . .	Louisville.

CHICAGO, AUGUST, 1877.

President,	F. H. REHWINKEL . .	Chillicothe, Ohio.
1st Vice-President,	L. D. SHEPARD . . .	Boston.
2d Vice-President,	GEO. T. BARKER . . .	Philadelphia.
Recording Secretary,	M. S. DEAN	Chicago.
Corresponding Secretary,	M. H. WEBB . . .	Lancaster, Pa.
Treasurer,	W. H. GODDARD . . .	Louisville.

NIAGARA FALLS, AUGUST, 1878.

President,	H. J. MCKELLOPS . .	St. Louis.
1st Vice-President,	L. D. SHEPARD . . .	Boston.
2d Vice-President,	L. D. CARPENTER . . .	Atlanta, Ga.
Recording Secretary,	GEO. H. CUSHING . . .	Chicago.
Corresponding Secretary,	A. O. RAWLS . . .	Lexington, Ky.
Treasurer,	W. H. GODDARD . . .	Louisville.

NIAGARA FALLS, AUGUST, 1879.

President,	L. D. SHEPARD . . .	Boston.
1st Vice-President,	C. N. PEIRCE . . .	Philadelphia.
2d Vice-President,	GEO. L. FIELD . . .	Detroit.
Recording Secretary,	GEO. H. CUSHING . . .	Chicago.
Corresponding Secretary,	M. H. WEBB . . .	Lancaster, Pa.
Treasurer,	W. H. GODDARD . . .	Louisville.

BOSTON, AUGUST, 1880.

President,	C. N. PEIRCE . . .	Philadelphia.
1st Vice-President,	W. C. BARRETT . . .	Buffalo.
2d Vice-President,	GEO. J. FRIEDRICHS . .	New Orleans.
Recording Secretary,	GEO. H. CUSHING . . .	Chicago.
Corresponding Secretary,	A. M. DUDLEY . . .	Salem, Mass.
Treasurer,	W. H. GODDARD . . .	Louisville.

NEW YORK, JULY, 1881.

President,	H. A. SMITH	Cincinnati.
1st Vice-President,	W. C. BARRETT . . .	Buffalo.
2d Vice-President,	GEO. J. FRIEDRICHS . .	New Orleans.
Recording Secretary,	GEO. H. CUSHING . . .	Chicago.
Corresponding Secretary,	A. M. DUDLEY . . .	Salem, Mass.
Treasurer,	W. H. GODDARD . . .	Louisville.

CINCINNATI, AUGUST, 1882.

President,	W. H. GODDARD . . .	Louisville, Ky.
1st Vice-President,	GEO. J. FRIEDRICHS . .	New Orleans.
2d Vice-President,	E. T. DARBY . . .	Philadelphia.
Recording Secretary,	GEO. H. CUSHING . . .	Chicago.
Corresponding Secretary,	A. W. HARLAN . . .	Chicago.
Treasurer,	GEO. W. KEELY . . .	Oxford, Ohio.

NIAGARA FALLS, AUGUST, 1883.

President,	E. T. DARBY	Philadelphia.
1st Vice-President,	C. S. STOCKTON . . .	Newark, N. J.
2d Vice-President,	T. T. MOORE	Columbia, S. C.
Recording Secretary,	GEO. H. CUSHING . . .	Chicago.
Corresponding Secretary,	A. W. HARLAN . . .	Chicago.
Treasurer,	GEO. W. KEELY . . .	Oxford, Ohio.

EXECUTIVE COMMITTEE FOR SESSION OF 1884.

J. N. CROUSE, Chairman. A. M. DUDLEY, Secretary.

FIRST DIVISION—COMMITTEE OF ARRANGEMENTS.

*ODELL, FIELD, AND FRIEDRICHS.

SECOND DIVISION—ON CREDENTIALS, ETHICS, AND AUDITING ACCOUNTS.

CROUSE, DUDLEY, AND PERRY.

THIRD DIVISION—ON VOLUNTEER ESSAYS.

*PEIRCE, *REHWINKEL, AND MORRISON.

LOCAL COMMITTEE OF ARRANGEMENTS.

M. L. RHEIN, F. M. ODELL, AND C. F. RICH.

* These go out August, 1884.

CONTENTS.

	PAGE
Disclaimer	2
Officers from date of organization	3–7
Roll-call	13–16
Amendment to Constitution adopted	16
Amendment offered by Dr. Allport indefinitely postponed	16
Executive Committee's report adopted fixing hours for meetings	16
Committee on Credentials' report	17
Publication Committee's report	17
Motion to appoint Committee on death of Dr. Webb	18
Motion to appoint Committee on death of Dr. Goddard	18
Motion to appoint Committee on death of Dr. Allen	18
Motion of thanks to The S. S. White Dental Manufacturing Co.	18
Fixing time and place of meeting of Sections	18
Committee's report on memorial to Dr. Webb	19
Section V. called	19
Section VI. called	19
Section VI. passed	19
Section V. again called	19
Motion to make Dr. Bödecker's paper special order for evening session	19
Section VII. called	19
Section VII. passed	19
Section I. called	19
Mr. Richardson, of London, introduced	19
Motion to suspend regular order	20
Motion to request dealers to close their doors	20
Motion to call Sections in regular numerical order	20
Prize Essay Committee's report	20
Dr. Bödecker's paper discussed	21
Dr. Bödecker's paper passed	21
Election of officers, time fixed for	21
Dr. Kingsley's address	21
Section I. further discussed and passed	21
Section II. called and report read	22
Motion to adopt resolution offered by Section II.	22
Motion to amend said resolution	22
Motion to further amend the same	22
Resolution offered by Section II. as finally amended and adopted	22
Resolution recommending Dental Schools to require preliminary examination of students	22

PAGE

Resolution opposing the conferring of titles or degrees by State Boards of Examiners 22
Report of Section II. adopted 22
Section II. passed 22
Memorial Committee's report on death of Dr. Goddard 23
Memorial Committee's report on death of Dr. Allen 23
Section III. called and reports read 23
Motion to incorporate paper of Dr. C. E. Francis in report of Section III. . 23
Section III. passed 23
Report of Committee on Voluntary Essays 23
Election of officers 24
Organization of Sections 24
Invitation to attend the Southern Dental Association 25
Officers installed 25
Thanks of the Association to various parties 25
Instructions to Secretary to draw orders 26
Salary of the Secretary fixed 26
Section IV. called 26
Motion to limit speakers to five minutes 26
Motion to reconsider the vote awarding the prize of two hundred dollars, and action thereon 26
Treasurer's report 26
Auditing of reports of Treasurer and Publication Committee . . . 27
Instruction to Secretary to appoint chairman and secretary of Sections . 27
Thanks voted 27
Local Committee of Arrangements appointed 27
Publication Committee appointed 27
Memorial pages 28–32

REPORTS AND VOLUNTEER PAPERS.

President's address 33

Section VI.

Paper on Syphilitic Teeth, by A. G. Friedrichs 36
Paper on Treatment of Pyorrhea Alveolaris, by A. W. Harlan . . . 40

Section V.

Paper on the Action of Arsenious Acid, by C. F. W. Bödecker . . . 55

Section VII.

Report, by W. C. Barrett, Chairman 67

Section I.

Report, by T. L. Buckingham, Chairman 70

Section II.

Report, by C. N. Peirce, Chairman *pro tem.* 83

SECTION III.

PAGE
Report, by J. Taft, Chairman 91
Paper, by W. H. Atkinson 99

SECTION IV.

Report, by E. T. Darby, Chairman 106

DISCUSSIONS.

SECTION VI.

Paper on Syphilitic Teeth—discussed by
Dr. Atkinson 44, 47
Dr. Peirce 45, 48
Dr. Darby 48, 49
Dr. Kingsley 49
Dr. Abbott 49
Dr. Barrett 49
Pyorrhea Alveolaris—discussed by
Dr. Bödecker 50
Dr. Darby 51
Dr. Abbott 52, 53
Dr. I. P. Wilson 52
Dr. Harlan 52
Dr. Atkinson 52
Dr. Daboll 53
Dr. Peirce 54

SECTION V.

Action of Arsenious Acid—discussed by
Dr. Peirce 60
Dr. Bödecker 61, 62, 63
Dr. Horton 61, 66
Dr. Watkins 61
Dr. Allport 61, 62
Dr. Abbott 62
Dr. Taft 62, 63, 65
Dr. Buckingham 64
Dr. E. Parmly Brown 64, 66
Dr. Park 65
Dr. Richardson 65
Dr. Atkinson 66

SECTION I.

Chemistry—discussed by
Dr. Buckingham 70
Artificial Dentistry—discussed by
Dr. W. H. Trueman 71
Dr. Stockton 73, 80
Dr. Bödecker 74
Dr. Priest 74

PAGE

Dr. Matteson 74
Dr. Kingsley 76, 79
Dr. Thomas 79
Dr. Watkins 80
Dr. Harroun 80
Dr. Dickerman 80
Dr. Horton 80
Dr. Cravens 80
Dr. Morrison 81
Dr. E. Parmly Brown 81
Dr. How 81
Dr. Barrett 81

SECTION II.

Education—discussed by
Dr. Hayhurst 85, 86, 90
Dr. Crouse 85, 88
Dr. Atkinson 85
Dr. Peirce 86, 87, 89
Dr. Buckingham 86, 89
Dr. Cushing 86
Dr. Allport 86, 88, 90
Dr. Barrett 86
Dr. Stockton 87
Dr. Marcklein 88
Dr. Rehwinkel 89

SECTION III.

Literature and Nomenclature—discussed by
Dr. Crouse 104, 105
Dr. Abbott 105
Dr. Moore 105

SECTION IV.

Operative Dentistry—discussed by
Dr. Taft 106
Dr. Horton 107, 108
Dr. Watkins 108, 109, 117
Dr. Rhein 108
Dr. Stockton 110
Dr. Buckingham 111
Dr. S. G. Perry 112, 116
Dr. Crouse 113
Dr. Peirce 114
Dr. Harlan 114, 115
Dr. V. H. Jackson 115, 116
Dr. Callahan 115
Dr. Atkinson 116
Dr. Marcklein 117
Dr. Priest 117

MINUTES OF TRANSACTIONS

OF THE

AMERICAN DENTAL ASSOCIATION.

SESSION OF 1883.

BY GEO. H. CUSHING, SECRETARY.

FIRST DAY—MORNING SESSION.

THE AMERICAN DENTAL ASSOCIATON commenced its Twenty-third Annual Session at the International Hotel, Niagara Falls, N. Y., on Tuesday, August 7, 1883, at 11 o'clock A.M., the first Vice-President, Geo. J. Friedrichs, in the chair.

The roll was then called, and the following were found either to be present or to have forwarded their dues:

ATKINSON, W. H.	41 East Ninth st., New York.
ABBOTT, FRANK	22 West Fortieth st., New York.
ALLEN, E. H.	Freeport, Ill.
ALLEN, JOHN	7 West Thirty-third st., New York.
ALLPORT, W. W.	240 Wabash ave., Chicago.
AMES, W. B.	34 Monroe st., Chicago.
BUCKINGHAM, T. L.	1228 Arch st., Philadelphia.
BROWN, S. B.	Fort Wayne, Ind.
BARRETT, W. C.	11 West Chippewa st., Buffalo, N. Y.
BUTLER, C. R.	519 Euclid ave., Cleveland, Ohio.
BAIRD, W. H.	Burlington, Iowa.
*BAUER, JOSEPH	130 Esplanade st., New Orleans, La.
BISHOP, J. ADAMS	32 West Thirty-sixth st., New York.
BÖDECKER, C. F. W.	60 East Fifty-eighth st., New York.
BOGUE, E. A.	29 East Twentieth st., New York.
BROWN, E. PARMLY	Flushing, Long Island, N. Y.
BOICE, ALONZO	1612 Vine st., Philadelphia.
*BRACKETT, C. A.	102 Touro st., Newport, R. I.

Those marked (*) were absent but sent their dues.
Those marked thus (d) were delegates.

Carpenter, L. D.	Atlanta, Ga.
Crouse, J. N.	2101 Michigan ave., Chicago.
Cowie, Henry	Detroit, Mich.
Cushing, G. H.	34 Monroe st., Chicago.
Clifton, W. R.	Waco, Texas.
Coyle, John H.	Thomasville, Ga.
Cravens, J. E.	Indianapolis, Ind.
Chappell, M. H.	Knightstown, Ind.
Cook, C. D.	133 Pacific st., Brooklyn, N. Y.
Callahan, J. R.	Hillsboro', Ohio.
Coolidge, J. B.	230½ Tremont st., Boston.
Colton, Aaron	Hudson, New York.
Cleland, James	Detroit, Mich.
Darby, E. T.	1513 Walnut st., Philadelphia.
Dudley, A. M.	304 Essex st., Salem, Mass.
Dickerman, D. S.	Taunton, Mass.
* Dorrance, W. H.	Ann Arbor, Mich.
Daboll, G. C.	Buffalo, N. Y.
d Degenhardt, Charles	123 Avenue A, New York.
Devore, J. H.	Corry, Pa.
Friedrichs, Geo. J.	155 St. Charles st., New Orleans.
Friedrichs, A. G.	155 St. Charles st., New Orleans.
Francis, C. E.	33 West Forty-seventh st., New York.
Field, G. L.	Detroit, Mich.
* Farrar, J. N.	1271 Broadway, New York.
Freeman, S. A.	14 Court st., Buffalo, N. Y.
Fundenburg, W. H.	323 Penn ave., Pittsburg, Pa.
Gardiner, Frank H.	126 State st., Chicago.
Gilmer, T. L.	Quincy, Ill.
* Gaylord, E. S.	New Haven, Conn.
How, W. S.	Chestnut st., cor. 12th, Philadelphia.
Horton, W. P.	Cleveland, Ohio.
Harlan, A. W.	70 Dearborn st., Chicago.
Hayhurst, J.	Lambertville, N. J.
* Hill, J. L.	Gettysburg, Pa.
Hacker, T. S.	Indianapolis, Ind.
Hoysradt, G. W.	Ithaca, N. Y.
* Hunter, Frank A.	123 West Seventh st., Cincinnati.
Hunt, P. G. C.	Indianapolis, Ind.
Hunt, A. O.	Iowa City, Iowa.
Howard, C. T.	15 Chestnut st., Rochester, N. Y.
Hamsher, F. M.	Delphi, Ind.
Harroun, C. H.	Toledo, Ohio.
* Ingersoll, L. C.	Keokuk, Iowa.
Jackson, H. H.	319 Jefferson st., Detroit, Mich.
Jackson, V. H.	51 East One Hundred and Twenty-Fifth st., New York.

KEELY, GEORGE W.	Cor. High and Main sts., Oxford, Ohio.
KEELY, CHARLES I.	Cor. High and Third sts , Hamilton, O.
d KING, W. Z.	Chico, Cal.
KINGSLEY, N. W.	25 West Twenty-seventh st., New York.
* KLUMP, G. W.	Williamsport, Penn.
* KINGSBURY, C. A.	1119 Walnut st., Philadelphia.
* LATHROP, JOS.	152 Woodward ave., Detroit, Mich.
LINE, J. E.	Rochester, N. Y.
LOWRY, M. B.	Brookville, Pa.
* LEITER, THOS. C.	Wadsworth, Ohio.
MOORE, E. C.	22 Lafayette ave., Detroit, Mich.
MOORE, THOS. T.	Columbia, South Carolina.
MORRISON, W. N.	1337 Washington ave., St. Louis.
MARCKLEIN, B. G.	Iron Block, Milwaukee, Wis.
MCELHANEY, G. W.	Columbus, Ga.
MATTESON, A. E.	3700 Cottage Grove ave., Chicago.
* MORGAN, HENRY W.	Nashville, Tenn.
MCKELLOPS, H. J.	2630 Washington ave., St. Louis.
MARRINER, J. FRANK	Ottawa, Ill.
MCMANUS, JAMES	Hartford, Conn.
ODELL, F. M.	7 West Thirty-eighth st., New York.
PEIRCE, C. N.	1415 Walnut st., Philadelphia.
* PALMER, S. B.	39½ Warren st., Syracuse, N. Y.
PERRY, S. G.	10 East Thirty-fourth st., New York.
PATTERSON, J. D.	Lawrence, Kansas.
PRIEST, A. N.	Utica, N. Y.
PARK, EDGAR	1418 Washington ave., St. Louis.
PETERSON, DENTON E.	Waterloo, N. Y.
PAGE, W. E.	110 Tremont st., Boston.
REHWINKEL, F. H.	Chillicothe, Ohio.
RHEIN, MEYER L.	7 West Thirty-eighth st., New York.
ROBINSON, J. A.	Jackson, Mich.
SAUNDERS, BOYD G.	Rochester, N. Y.
* STARBUCK, W. C.	Jamaica Plain, Mass.
* SHEPARD, L. D.	100 Boylston st., Boston.
SMITH, H. A.	286 Race st., Cincinnati.
SMITH, J. H.	New Haven, Conn.
STOCKTON, C. S.	Newark, N. J.
TRUEMAN, W. H.	900 Spruce st., Philadelphia.
* TALBOT, E. S.	125 State st., Chicago.
TAFT, J.	122 West Seventh st., Cincinnati.
THOMAS, G. R.	Detroit, Mich.
* TILLINGHAST, W. H.	220 Westminster st., Providence, R. I.
VIET, MARTIN	12 Dauphine st., New Orleans.
* WENDEL, WM. C.	Room 2, Iron Block, Milwaukee, Wis.
WILLIAMS, I.	New Philadelphia, Ohio.
WATKINS, S. C. G.	Montclair, N. J.

Woodward, W. B. . . .	Peoria, Ill.
* Waters, G. F.	8 Beacon st., Boston.
Wilson, I. P.	Burlington, Iowa.
Watling, J. A.	Ypsilanti, Mich.
Wadsworth, T. A. . . .	68 West Thirty-seventh st., New York.
White, Samuel A. . . .	Savannah, Ga.

On motion the reading of the printed minutes was dispensed with.

The first Vice-President, Dr. Friedrichs, then made a brief address.

The following amendment to the Constitution, proposed last year, was then adopted:

To add to Section 7 of Article V. the following: "All resolutions appropriating money, except for the legitimate expenses of this Association, shall require a two-thirds vote of all the members present."

The following amendment offered last year by Dr. Allport was indefinitely postponed:

To amend Article V. Section 1, as follows: In line *four*, after the words, "Executive Committee," strike out all the remaining section, and insert, "All candidates for office shall be put in nomination by a committee appointed for that purpose, consisting of one member from each Section of the Association appointed by such Section, who shall put in nomination three candidates for each office of the Association. When the nominations are made, the election shall be by ballot in the order named in the Constitution. In case no candidate receives a majority of all the votes on the first ballot, the candidate receiving the lowest number of votes shall be dropped, and the ballot shall be taken upon the two remaining candidates, and the one receiving a majority of the votes shall be declared elected."

The Executive Committee reported, recommending the following:

That the afternoon of to-day be devoted to the work of Sections; that after to-day the meetings be held from 9 A. M. till 2 P. M., and from 8 P. M. till adjournment.

Adopted.

The Committee on Credentials made a partial report, which was subsequently completed and adopted, as follows:

California State Dental Society—W. Z. King.
Chicago Dental Society—J. N. Crouse, A. E. Matteson, Frank H. Gardiner, W. B. Ames.
Detroit Dental Society—Henry Cowie, E. C. Moore.
First District Dental Society of the State of New York—W. H. Atkinson, T. A. Wadsworth, Chas. Degenhardt, V. H. Jackson, C. F. W. Bödecker.
Georgia State Dental Society—John H. Coyle, Geo. W. McElhaney, Samuel A. White.
Illinois State Dental Society—A. W. Harlan, Geo. H. Cushing, E. H. Allen, W. B. Woodward, T. L. Gilmer, J. Frank Marriner.
Indiana State Dental Association—S. B. Brown, J. E. Cravens, T. S. Hacker, M. H. Chappell, F. M. Hamsher.
Iowa State Dental Association—W. H. Baird, A. O. Hunt, I. P. Wilson.
Kansas State Dental Association—Jno. D. Patterson.
Lake Erie Dental Society—J. H. Devore.
Michigan State Dental Society—Denton E. Peterson.
New England Dental Society—A. M. Dudley.
New Jersey State Dental Society—Frank M. Odell, J. Hayhurst, S. C. G. Watkins.
New Orleans Odontological Society—Andrew G. Friedrichs, Martin Viet.
New York Odontological Society—Frank Abbott, N. W. Kingsley, E. A. Bogue.
Northern Ohio Dental Association—C. R. Butler.
Odontographic Society of Pennsylvania—Alonzo Boice.
Odontological Society of Western Pennsylvania—M. B. Lowry.
Ohio State Dental Society—Geo. W. Keely.
Pennsylvania Association of Dental Surgeons—Wm. H. Trueman, T. L. Buckingham.
St. Louis Dental Society—W. N. Morrison, Edgar Park.
Second District Dental Society of the State of New York—E. Parmly Brown.
Seventh District Dental Society of the State of New York—B. G. Saunders, C. T Howard.
The Dental Society of the State of New York—J. Edward Line.
Texas State Dental Association—W. R. Clifton.
Wisconsin State Dental Society—B. G. Marcklein.

The following report of the Publication Committee was then read and referred to the Executive Committee:

The Publication Committee would report that, under the instructions of the Association, they made arrangements with The S. S. White Dental Manufacturing Co. whereby the Transactions were furnished by that company without cost to the Association, and the committee wish to express their thanks to Mr. Hise for the careful supervision of his part of the work.

The Transactions were mailed in the latter part of January, 1883, to all the members entitled to them, as also to various libraries, universities, journals, and all honorary members, leaving in the hands of the Secretary about fifty copies.

The following is the account of receipts and expenditures by the Committee:

Received of Treasurer		$30 00
Expended for expressage, wrapping-paper, copying and stationery..	$9 45	
Postal-cards and printing notices and pasters	4 25	
Postage	18 00	31 70
Leaving balance due the Committee		1 70

All of which is respectfully submitted.

GEO. H. CUSHING, *Chairman.*

NIAGARA FALLS, Aug. 7, 1883.

We have examined the above and find it correct.

J. N. CROUSE,
A. M. DUDLEY, } *Auditing Com.*

On motion of Dr. Peirce the following were appointed to draft a memorial on the death of Dr. Marshall H. Webb: Drs. C. N. Peirce, E. T. Darby, and S. G. Perry.

On motion of Dr. Rehwinkel the following were appointed to prepare resolutions on the death of the late President, Dr. Wm. H. Goddard: Drs. F. H. Rehwinkel, J. Taft, and G. W. McElhaney.

On motion of Dr. Odell the following were appointed to prepare resolutions touching the death of Dr. W. H. Allen: Drs. F. M. Odell, W. H. Atkinson, and C. S. Stockton.

On motion of Dr. Priest the thanks of the Association were tendered to The S. S. White Dental Manufacturing Co., for the prompt and satisfactory manner in which they have furnished the Transactions to this Association.

Sections were then called, and place and time of their meetings were fixed.

Adjourned to meet at 9 A.M. to-morrow.

SECOND DAY—MORNING SESSION.

The Association met at 9.30. Dr. Friedrichs in the chair.

The minutes were read and approved.

The committee on the memorial to Dr. M. H. Webb submitted their report, which was adopted, and will be found in the memorial pages.

Remarks were made by Dr. J. Taft.

Section V. being called was not ready to report.

Section VI. was then called, and a paper was read by Dr. A. G. Friedrichs, of New Orleans, on "Syphilitic Teeth."

Discussed by Drs. Atkinson, Peirce, Darby, Kingsley, Abbott, Park and Barrett.

Dr. Harlan then read a paper on the "Treatment of Pyorrhea Alveolaris."

Discussed by Drs. Bödecker, Darby, Abbott, Wilson, Atkinson, Daboll, and Peirce.

On motion Section VI. was passed.

On motion of Dr. Horton, Section V. was again called, and Dr. Bödecker read a paper on the "Action of Arsenious Acid on Dentinal and Pulp Tissue."

On motion the discussion of this paper was made the first order for this evening.

Section VII. being called, a report was read by Dr. Barrett, chairman.

Section VII. was on motion passed, and Section I. was called, and Dr. Buckingham, the chairman, made a report, which was adopted.

Remarks were then made by Drs. Buckingham, Trueman and Stockton.

After which Dr. Atkinson introduced Mr. Richardson, of London, England, who was accorded the privileges of the floor.

Section I. was further discussed by Drs. Bödecker, Priest, and Matteson.

On motion the regular order was suspended and miscellaneous business was taken up.

Dr. Odell offered the following:

Resolved, That it is the special request of the American Dental Association that exhibitors of dental instruments and supplies close their doors and keep them closed during the sessions of this body.

Adopted.

On motion of the same gentleman the following was adopted:

Resolved, That hereafter the calling of the Sections shall be in regular progressive numerical order, and in case any Section is not ready to report when called, such Section shall be passed without recall until it again comes up in its regular order.

The Committee on Credentials made a supplementary report.

The Secretary announced that Dr. Bödecker would be present and exhibit his specimens with the microscope at 7 P.M. in this room.

Adjourned till 8 this evening.

SECOND DAY—EVENING SESSION.

The Association met at 8.30 P.M. Dr. Friedrichs in the chair.

The minutes of the morning's session were read and approved.

Under the call for miscellaneous business the Committee on Prize Essays made their report, which was accepted and discussed by Drs. Butler, Crouse, Atkinson, Barrett, and Horton, and finally adopted, as follows:

Your committee, to whom was assigned the duty of deciding upon the merits of essays upon the etiology of dental caries, presented in competition for a prize of two hundred dollars, which was last year appropriated by this Association for the purpose, would respectfully report that but one essay has been received, and that from the hands of Dr. W. D. Miller, of Berlin, Germany.

The committee have carefully read this, and, while the views contained therein are not original, many of his experiments, which are in detail and made for the purpose of confirming his theory, have not been previously published. Your committee would therefore, in view of the original work which the author has prosecuted during the past two years, the results of which are given in this paper, award to the essayist the two hundred dollars appropriated for the purpose.

Signed by Committee, { C. N. PEIRCE, *Chairman.*
E. T. DARBY.
H. A. SMITH.

The special order for the evening, being the consideration of Dr. Bödecker's paper, was then called, and the following took part in the discussion: Drs. Bödecker, Peirce, Horton, Buckingham, Watkins, Allport, Abbott, Taft, E. Parmly Brown, Park, Richardson of London, and Atkinson.

On motion the subject was passed.

On motion the time for fixing the place of next meeting and the election of officers was set for to-morrow (Thursday) evening at 8 o'clock.

Dr. Kingsley then addressed the Association on the subject of Correcting Imperfect Speech by Mechanical Appliances.

On motion adjourned till 9 A.M. to-morrow.

THIRD DAY—MORNING SESSION.

The Association met at 9.45 A.M. Dr. Friedrichs in the chair.

The minutes of the evening session were read and approved.

The Committee on Credentials made a further supplementary report.

Section I., the regular order, being called, was further discussed by Drs. Watkins, Stockton, Harroun, Dickerman, Cravens, Morrison, Perry, E. Parmly Brown, Buckingham, and How.

On motion the Section was passed.

Section II. being called, its report was read by Dr. C. N. Peirce, chairman *pro tem.*

Discussed by Dr. Hayhurst, when a motion was made that the resolution offered in the report be adopted.

Dr. Peirce moved to amend the resolution by striking out the last three words.

Discussed by Drs. Hayhurst, Barrett, and Stockton.

Dr. Allport moved to further amend by striking out the words "or Master."

Dr. Peirce accepted Dr. Allport's amendment, so that the motion now stands—that the report be amended by striking out the words after Doctor "or Master," and the last three words—"or its Equivalent." Adopted. And the resolution as amended was then adopted as follows:

Resolved, That the interests of the profession and advanced dental education both demand that all dental educational institutions shall require that every student, before being admitted to examination for the degree of Doctor of Dental Surgery, shall have taken two full courses of lectures.

Dr. Rhein offered the following:

Resolved, That the American Dental Association recommend to every dental educational institution the necessity of requiring a thorough preliminary examination before admitting any person as a student of the college.

Dr. Peirce offered the following, which was unanimously adopted:

Resolved, That the American Dental Association deems it adverse to the interest of the dental profession for any State board of examiners to confer a title or degree of any nature.

Education was further discussed by Drs. Rehwinkel, Peirce, Allport, and Hayhurst.

On motion the report of Section II. as a whole was adopted.

On motion the subject was passed and the regular order sus-

pended, in order to hear the report on the death of our late presiding officer, Dr. W. H. Goddard.

The report was adopted by a rising vote, and will be found in the memorial pages.

The report of the committee on the death of Dr. W. H. Allen was also presented and adopted by a rising vote, and will be found in the memorial pages.

Section III. being called, Dr. Taft read a report on Literature and Nomenclature. Dr. Atkinson then read a report on Nomenclature, and was followed by Dr. Taft, who read a paper also on Nomenclature, written by Dr. Geo. J. Friedrichs.

Dr. Butler moved that Dr. Francis's paper, which was not read, be incorporated in the report by Dr. Taft, of Section III., in the discretion of the Publication Committee. Carried. Dr. Friedrichs's paper was also to be incorporated in the report.

Section III. was discussed by Drs. Crouse, Abbott, and Moore.

On motion of Dr. Odell Section III. was passed.

The Committee on Voluntary Essays reported that they had in their hands a paper by E. Parmly Brown, on "Dentistry; its Past its Encouraging Present, and Brilliant Future," and recommended that it be read.

It was voted to hear the paper at once.

Dr. Brown not responding to the call the Association adjourned to meet at 8 P.M.

THIRD DAY—EVENING SESSION.

The Association met at 8 P.M. Dr. Friedrichs in the chair.

The minutes of the morning session were read and approved.

The special order for the evening being the selection of the next place of meeting and election of officers, the Executive Committee reported the names of Washington, Saratoga, and St. Louis. Saratoga was selected on the first ballot.

The Association then proceeded to ballot for officers, and elected the following:

President—E. T. Darby, of Philadelphia.
First Vice-President—C. S. Stockton, of Newark, N. J.
Second Vice-President—T. T. Moore, of Columbia, S C.
Corresponding Secretary—A. W. Harlan, of Chicago.
Recording Secretary—Geo. H. Cushing, of Chicago.
Treasurer—Geo. W. Keely, of Oxford, Ohio.
Executive Committee—S. G. Perry, of New York; Geo. J. Friedrichs, of New Orleans; W. N. Morrison, of St. Louis.

The Sections were then called and organized as follows:

Section I. Artificial Dentistry, Chemistry, and Metallurgy.—W. H. Trueman, chairman; C. S. Stockton, secretary; J. Hayhurst, C. H. Harroun, A. O. Hunt, Alonzo Boice, W. H. Dorrance, S. A. Freeman, J. D. Patterson, Geo. S. Shepard, Thos. C. Leiter, John Allen, W. B. Ames, W. W. Evans, Henry Cowie, T. S. Hacker, C. T. Howard, H. H. Jackson, Jos. Lathrop, A. E. Matteson, H. B. Noble, J. W. Rhone, S. W. Dennis, Boyd G. Saunders, J. A. Robinson, J. A. Watling, E. Honsinger, D. D. Smith, H. H. Keith, J. G. Harper.

Section II. Dental Education.—C. N. Peirce, chairman; J. N. Crouse, C. D. Cook, D. S. Dickerman, W. N. Morrison, G. R. Thomas, G. W. McElhaney, J. Frank Marriner, W. H. Morgan, K. B. Davis, C. J. Essig, J. G. Templeton, T. W. Brophy, Thos. Fillebrown.

Section III. Dental Literature and Nomenclature.—J. Taft, chairman; F. H. Rehwinkel, secretary; W. H. Colgrove, A. L. Northrop, E. A. Bogue, C. E. Francis.

Section IV. Operative Dentistry.—E. T. Darby, chairman; H. J. McKellops, secretary; J. E. Cravens, T. T. Moore, Geo. L. Field, S. C. G. Watkins, B. G. Marcklein, S. G. Perry, J. R. Callahan, W. R. Clifton, E. C. Moore, C. I. Keely, Geo. W. Keely, Edgar Park, A. N. Priest, E. H. Allen, F. M. Hamsher, W. B. Woodward, C. R. Butler, E. Parmly Brown, J. B. Coolidge, W. C. Starbuck, W. E. Page, W. H. Baird, Jas. McManus, I. Williams, W. O. Kulp, M. F. Finley, J. R. Clayton, Eugene H. Smith, L. D. Shepard, S. B. Palmer, P. G. C. Hunt, G. W. Klump, W. H. Tillinghast, Sam'l A. White, A. F. Emminger, J. H. Boger, O. N. Heise, D. J. Pollock, S. B. Brown, J. Adams Bishop, J. L. Hill, G. W. Hoysradt, F. A. Hunter, V. H. Jackson, J. H. Smith, Wm. Dutch, D. W. Clancy, A. Wilkes Smith, S. D. Stewart, Ira Brown, S. A. Garber.

Section. V. Anatomy, Histology, and Microscopy.—M. L. Rhein, chairman; J. Edward Line, secretary; Frank Abbott, C. F. W. Bödecker, Geo. H. Cushing,

T. L. Gilmer, Geo. F. Waters, A. Colton, James Cleland, J. C. Whinery, Geo. H. Wilson, H. C. Meriam, R. R. Andrews, E. D. Swain, A. H. Brockway, L. G. Noel.

SECTION VI. Pathology, Therapeutics, and Materia Medica.—A. W. Harlan, chairman; F. M. Odell, secretary; A. G. Friedrichs, M. Viet, Geo. J. Friedrichs, A. M. Dudley, M. B. Lowry, G. C. Daboll, C. A. Brackett, T. A. Wadsworth, M. H. Chappell, Otto Arnold, G. A. Mills, W. W. Allport, C. A. Kingsbury, C. S. Beck, Chas. P. Pruyn, J. H. Devore, Frank H. Gardiner, Saml. E. Knowles, D. C. McNaughton, J. Hooper, A. W. Freeman, A. O. Rawls, E. Noyes, C. A. Kitchen.

SECTION VII. Physiology and Etiology.—W. C. Barrett, chairman; H. A. Smith, secretary; W. Storer How, W. P. Horton, I. P. Wilson, Denton E. Peterson, L. C. Ingersoll, J. N. Farrar, N. W. Kingsley, J. H. Coyle, Henry W. Morgan, C. M. Wright, W. H. Fundenburg, E. S. Talbot, Gale French, J. G. W. Werner, F. H. Waldron, S. E. Davenport, W. D. Kempton, E. G. Betty.

Adjourned to meet at 9 A.M. to-morrow.

FOURTH DAY—MORNING SESSION.

The Association met at 9.30 A.M. President elect, E. T. Darby in the chair.

The minutes of last evening's session were read and approved.

The Committee on Credentials made their final report, which was adopted.

Dr. McKellops, President of the Southern Dental Association, extended, on behalf of that body, a most hearty invitation to this Association to meet with them at their next meeting to be held at Lexington, Kentucky, on the first Tuesday of May, 1884, with the assurance that "the latch-string would always hang on the outside."

On motion the newly-elected officers were installed, and Drs. Rehwinkel and McKellops were appointed to conduct the lately elected President to the chair.

On motion the thanks of the Association were extended to Dr. Friedrichs, the retiring President; also, to the Secretary and Treasurer and the Local Committee of Arrangements, and particularly to Dr. Gates, of Niagara Falls, for his many and courteous favors.

On motion the Secretary was instructed to draw orders on the Treasurer for the payment of all bills properly due.

Upon the recommendation of the Executive Committee, by motion which prevailed, the salary of the Secretary was increased to two hundred dollars, the increase to apply to the year last past.

The regular order was now taken up, and the report of Section IV. was read by the chairman, Dr. E. T. Darby.

Discussed by Drs. Taft, Horton, and Watkins.

On motion it was voted that speakers shall be limited to five minutes and shall speak but once.

Subject was further discussed by Drs. Rhein, Stockton, Buckingham, Perry, Crouse, Atkinson, Peirce, Harlan, Callahan, Jackson, Marcklein, and Priest.

On motion the rules were suspended in order to transact some miscellaneous business.

Dr. Rehwinkel moved a reconsideration of the resolution adopted yesterday, which awarded the prize of two hundred dollars as recommended by the Committee on Prize Essays.

The motion prevailed.

Dr. Atkinson moved that the subject be referred to the same or some other Committee. Carried.

On motion it was submitted to the same Committee, they to report next year.

The Treasurer's report was submitted, as follows:

Geo. W. Keely, Treasurer, in account with the American Dental Association.

Dr. To balance on hand August 5, 1882	$1446.60
Received since last meeting	95.00
Received dues this year	635.00
	$2176.60

Cr.	By paid G. H. Cushing, Chairman Publication Committee, for incidental expenses	$30.00
	Paid A. Cluck for use of parlor for this meeting	50.00
	G. L. Field, expenses of Committee of Arrangements	16.45
	Geo. H. Cushing, salary as Secretary	200.00
	Geo. H. Cushing, for reporter	125.00
	Geo. H. Cushing, balance on last year	1.70
	Geo. W. Keely, salary as Treasurer	100.00
	Geo. W. Keely, postage and expressage	5.75
		$528.90
	Balance on hand	1647.70
		$2176.60

Approved:

J. N. Crouse,
A. M. Dudley,
S. G. Perry,
} *Auditing Committee.*

The Executive Committee reported that they had audited the reports of the Treasurer and the Publication Committee and found them correct.

The report was adopted.

On motion the Secretary was instructed to designate the chairman and secretary of any Section which fails to organize at this meeting.

A vote of thanks was tendered to the hotels, the press, the proprietors of Prospect Park and Goat Island, and the railroads, for courtesies shown this Association.

The President appointed as the Local Committee of Arrangements M. L. Rhein, chairman; F. M. Odell and C. F. Rich.

He also appointed on the Publication Committee A. W. Harlan and S. G. Perry.

The minutes were then read and approved, and on motion the Association adjourned to meet at Saratoga on the first Tuesday in August, 1884.

Geo. H. Cushing, *Secretary.*

IN MEMORIAM.

WM. H. GODDARD.

The chair of our President is draped with the insignia of grief and mourning, indicating that its proper occupant is not with us, and that this Association has met with bereavement.

Dr. Wm. H. Goddard, President of this Association, is no more. He died at his home in the city of Louisville, Ky., on the morning of March 4, 1883, after a prolonged illness and great sufferings.

Aside from the fact that it is the first officer of this Association whose loss we mourn, the character of our friend and colleague, as a man, was such that this Association honors itself by giving expression to its feelings of sincere and heartfelt sorrow at his death, and its profound respect for and appreciation of his many noble and manly traits of character. He was the personification of honor and integrity; conscientious and exact—even to apparent sternness—in the fulfilment of duties, either assigned to him or voluntarily assumed.

Though modest and unpretending, yet he was possessed of that manly independence of thought and opinion which enabled him to become on important occasions a valuable counsellor. Among his peers, he was positive and strong in asserting and defending his convictions, yet never arrogant or overbearing in his manner.

In his exterior, our friend was not endowed by nature with that smooth and polished suavity of manner and address which attracts and charms at first sight, yet his excellence and strength of character soon won for him friends and honors. With all his apparent sternness of manner, he was at heart exceedingly kind and gentle.

Honors came to him unsought; and whatever station in life he occupied or whatever trusts he administered, he was honest and faithful. His death is mourned by many who have lost in him a guardian, trustee, adviser, or friend.

In his family circle and among his more intimate friends, he was kind and affectionate. He was at times quite humorous, and well enjoyed an innocent practical joke.

We all know what he was to the American Dental Association,—for fourteen successive years its Treasurer, until finally called to take the gavel and be its President. Many of us have reason to remember him as an impartial but exact and unflinching officer.

In his profession he strove to be abreast of the times; there was no standing still or retrograde movement with him; he was always up and doing. His career in life has been an interesting and eventful one, and would furnish material for an extended obituary. This has already been written by able and loving friends.

In token of our affectionate regard for our departed brother, let a page of our records receive this our memorial and the expression of the sincerest sorrow of this Association at his demise.

Let his widow and family receive the assurance of our sympathy and condolence with them in their bereavement and distress, and our best wishes for their future welfare.

WILLIAM H. ALLEN.

WHEREAS, We are called upon to mourn the loss of our estimable friend and co-member and former President of this Association; it is therefore

Resolved, That in the demise of William H. Allen we have sustained a great loss. And that we sincerely sympathize with his family in this visitation, and that a page be set aside in the records of this Association as a memorial of our respect and esteem. And further, that a copy of these resolutions be forwarded to the family of the deceased.

William H. Allen, who departed this life on Monday, October 23, 1882, at the age of sixty-two, was one of the remarkable and representative men of the age.

By his father, Samuel Allen, a well-known mechanician, inventor, and civil engineer of eastern Massachusetts, he was descended from the renowned Gen. Ethan Allen, of Revolutionary fame.

His grandmother was sister of President Maxcy, of Brown University.

Commencing with an ordinary common-school education, he, in 1838, pursued an academic course of one year at Norwich, Conn. In the autumn of 1839 he commenced the study of the profession of dentistry with his elder brother and associate, then constituting the firm of Hawes & Allen, at Park place, New York.

Drs. Hawes and Allen were leading men in the profession; the latter, Dr. Chas. C. Allen, being for many years editor of the first dental journal established in the State of New York, *The Dental Recorder*.

After completing his course of study with Hawes & Allen, the subject of this sketch settled in Norwich, Conn., and enjoyed a large and successful practice for seventeen years.

On account of ill-health he spent the winter of 1849–50 in the Southern States, returning in the spring; but in 1851, for the same reason, he sailed for Buenos Ayres, and after narrowly escaping death by shipwreck arrived at Montevideo, February 4, 1852, the same day that Rosas was deposed. Exhibiting his diploma from the Society of Dental Surgeons of the State of New York to the Medical Junta he was allowed to practice without the usual examination and fee. He remained at Montevideo during the year practicing in his profession, and then with renewed health he returned to Norwich, Conn., where he remained until 1856, when at the solicitation of his brother he came to New York; as the event proved, to succeed him in business; Dr. Chas. C. Allen dying in 1857.

William H. Allen was one of the incorporators of the New York College of Dentistry; a trustee of that institution, and at the time of his death and for sev-

eral years previously, president of the board. He delivered the first clinical lecture in that institution, and has ever since been an active member of the clinical board.

He was ever one of the first to adopt and adapt new ideas and appliances as they arose and could be made serviceable, and many years ago acquired a reputation in the restoration of broken-down and worn teeth to their normal length and contour by building with gold. This operation is now quite common; but twenty-four years ago, when he performed successfully the most extensive operations of the kind which had yet been attempted, restoring almost entire arches of dental organs to usefulness, dentists of the first standing would not believe the reports of cases submitted by him; and in one instance a deputation was appointed to call upon one of his patients and ascertain whether he told the truth. The report was like that made by the Queen of Sheba.

Being always favorable to whatever promoted dental education, his voice was always in the affirmative for "association," and elevation of the standard of excellence in dental instruction and practice.

The Brooklyn Dental Society, for years a lively and instructive association, was inaugurated in his office, No. 18 West Eleventh street. He was president of the First District Dental Society of the State of New York for two years; unanimously elected a life member of the New York State Dental Society; member of the Academy of Dental Science of Boston; corresponding member of the Odontographic Society of Philadelphia, and in 1863 was unanimously elected President of the American Dental Association.

He had a fine tenor voice and was a skilled performer upon the violin, which two favorite means of enjoyment were turned to good account by him, in that he was at various times leader and conductor of the first orchestra in Connecticut; conductor of a church choir; for several years leading tenor of Christ Church under the pastorate of Rev. Dr. Morgan, now rector of St. Thomas's Church, New York; member of the famous University Quartette Club, of New York city; member and at one time president of the Mendelssohn Union, of New York, and executive officer of the Mendelssohn Union at the time they brought out in connection with Theodore Thomas and his orchestra, Beethoven's "Ninth Symphony."

He obtained several patents for inventions,—all conspicuous for their direct simplicity of construction and perfect adaptability to the end sought to be accomplished.

In disposition he was a man among men; during nearly eleven years of the most intimate business and social connection with him, the writer does not remember a single instance where he ever so far forgot himself as to raise his voice above its ordinary pitch.

There was never a moment when his brain did not dominate his every action.

It was to this quiet reservation of nerve-force that he owed much of his professional success; enabling him to meet his patients with urbanity, control them when undergoing severe treatment, and, with a clearness of judgment seldom equaled, to pick up exactly the right instrument at the right time and make every movement tell in furthering the work in hand.

Like his father, he was a spontaneous mechanician; and whatever he laid his hand to, was as it were by a spontaneous selection done in a manner admitting of little or no possibility of revision for the better.

MARSHALL H. WEBB.

This Association desires permanent record made of the loss incurred by it, and by the dental profession, in the death of their late member, Dr. Marshall H. Webb, whose decease occurred since our last meeting.

Dr. Webb was possessed of such manipulative skill as has been attained by very few dental practitioners. His preëminence in this respect, which was almost universally conceded, was not so much the result of superior natural gifts as of rare concentration and persistence in efforts to excel. He was not content unless in every operation he realized his ideal; and was not only earnest and conscientious, but almost censurably ambitious. He was not satisfied to work as well as the best, not even content to outdo all others, but strove always to improve on his own performances, constantly advancing his standard of requirements.

There was, however, no element of selfishness in his professional labors; his was not an ignoble strife for leadership; he was ready and willing to tell to any student or practitioner the methods by which he reached his results; not only ready and willing but eager to show all the steps of an operation, and never so happy as when he succeeded in awakening or stimulating an ambition in others to acquire a skill equal to his own. In this manner he did much to improve the quality of service in very many dental offices throughout the country.

He has left many followers whose first ideas of thoroughness in dental operations date from the time of their witnessing a clinic by Dr. Webb. These have in turn become centres from which like influences are emanating, and thus, though resting from his labors "his works do follow him."

Resolved, That a copy of the foregoing expression of our loss, and of our appreciation of Dr. Webb's worth, be inscribed upon a memorial page in the Transactions, and that a copy also be sent to the family of our departed friend.

Dr. Taft: It would seem that some individual expression would be apropriate in addition to this report. There are several aspects of Dr. Webb's character well worthy of thought and reflection.

Not only should we remember what Dr. Webb did as an operator, and what he did in the communication of his methods to others; but we should bear prominently in mind the influence that has gone out from him, and will continue to exert itself in an exemplary way upon the young men of our profession. He was comparatively a young man, and his influence upon the young was great.

But his influence was also acknowledged by all the members of the profession during these later years. We were always glad to recognize his ability, to learn that which he could communicate to us, and to acknowledge the very high attainments which he had reached in his chosen profession.

He has gone; but his example will ever be a point to which young

men of the future should aim. Young men could hardly hope to attain a higher position in efficiency than that attained by Dr. Webb, but all should seek to come as near to it as possible.

Dr. Webb has left us a written record of that which he has accomplished, in the papers which have recently been published by The S. S. White Dental Manufacturing Company. These are very valuable, indeed, not that they constitute a systematic treatise of practical dentistry, but because within them are embraced the leading methods of his practice which will be valuable to every one,—the student and the practitioner as well.

His memory claims our honor; for he labored not for his own aggrandizement, but for the good of the profession and for the establishment of a high standard in dental practice.

Annual Address.

By G. J. FRIEDRICHS, Acting President.

Gentlemen of the American Dental Association:

By divine permission we are here convened to confer upon the high interests of our profession, but the pleasure which I experience in again beholding so many familiar faces is mingled with emotions of sorrow that from our midst are forever removed three of our best known and most valued members. Dr. William H. Allen, of New York, Dr. Marshall H. Webb, and our late president, Dr. Wm. H. Goddard, since our last reunion have all embarked upon the vast and mysterious ocean of eternity. As the successor of one, as the friend of two of them, and in my official capacity, I feel it my first duty to voice the sentiments of all assembled here and twine one single flower in the wreaths of respect, of love, and of regret already woven in their honor by the profession at large, and by all men by whom eminent attainments, modesty, and true worth are revered and glorified.

Dr. Marshall H. Webb, prominent in his profession, stricken in the prime of life and in the ripeness of his intellectual powers—vain were it here to name his many virtues, or linger amid the details of a career, short but brilliant, and so well known to you all. Indeed, I feel my humble abilities inadequate to accord the meed of justice his memory deserves, though my heart proclaims his worth and our great loss in a language more deep and more eloquent than words. His busy mind and willing hands are now stilled in "death's cold embrace;" the sunshine of his marked personality and his genial ways to those who knew him is forever extinguished; no longer will the accents of his voice, ever freighted with wisdom and goodly advice, be heard at our council board, and as we instinctively turn to greet the once familiar form, absence only too pathetically and too truly reminds us that indeed of him there are

> "Deposited upon the silent shore
> Of memory, images and precious thoughts
> That shall not die and cannot be destroyed."

Our late president, the honored and lamented Wm. H. Goddard, like a noble tree which has withstood the blasts of many winters, but at last succumbs to the sturdy strokes of relentless time and lies prone with all its glorious fruits full upon it, has passed away in the fullness of years.

What happiness, what consolation must fill our breasts upon the reflection that this Association honored him with the highest distinction within its bestowal—one to which his faithful services as its Treasurer for so many years so justly entitled him—a boon which may be honorably craved by any member, and for the enjoy-joyment of which he felt, with a prophetic impulse, that this would be his last opportunity.

Our science has suffered a loss great indeed. True, brighter names may adorn her page; achievements greater than his may shed more lustre upon her; but Dentistry ne'er nurtured a son more true to her principles, more zealous for her advancement, more regardful of her integrity, more worthy of her traditions, or more deserving of her honors.

Gentlemen, membership in your Association was a voluntary act on my part. To cast my feeble abilities with the standard-bearers of our specialty was a duty I felt I owed to the profession of my choice. Imbued with these sentiments, I can scarcely realize, although ambition is laudable, that I am so soon called upon to preside over a body of men, to whose talents and abilities and labors for the cause, in the last twenty-three years, is mainly due the present status of dentistry—a profession now recognized as embodying a science and an art, not alone in the United States of America, but in every enlightened nation of the world.

Some here present may question my assertion as to whether this Association is entitled to the proud distinction I have just given it, as there were other organizations in the field—not to mention the good work accomplished by our dental colleges, in providing a higher grade of education. But what other organization required the adoption of a Code of Ethics, and that delegates from local or State societies should hold the degree of doctor of dental surgery before they could be admitted to membership? None but the American Dental Association. This restrictive proviso in its constitution immediately placed it upon a higher plane than any of its competitors, upon the principle that to secure a status as a scientific body it was necessary to invite into its fold those only who had already secured that status as individuals. This body alone recog-

nized that every fountain must be pure, if the stream is to reflect from its pellucid bosom heaven's own purity.

Moreover, in the Transactions of this Association future generations may view the progress and history of dentistry throughout the civilized world, during the twenty-three years of its existence; and were its career, so fraught with usefulness and so pregnant with grand possibilities, now to end; were not another page to be added to its vast contributions to our well-beloved science; the record of what it has already accomplished, and the important role it has played in the arena of dental thought, would constitute a monument worthy of the hands that reared it, and which the remorseless tooth of time could never efface.

Every association,—in fact, every individual,—has a mission to perform. Our special mission is the alleviation of human suffering. What greater incentive could we have, beyond the sordid gain of filthy lucre, to stimulate the power within us to action? Surely, it is the grandest and noblest work in which the skill and talents of man can be enlisted, and is indeed godlike in its nature.

We are laborers in the field of human progress, and it is only through organized association that dental thought can be thoroughly disseminated and usefully applied. The advantages of personal interchange of thought evolved by discussions which arise in our assemblies are not attained by merely reading the journals in the seclusion of our offices. There is something in this friction of mind against mind which stimulates to action, engenders a high-toned emulation, practically induces investigation, and leads to higher development.

Much has been accomplished; yet we are only at the threshold of our science. Through our labors many new channels for thought and research have been opened, and if the flood sometimes has seemed to spread too far and lose itself in shallow or sandy places, it has nevertheless tended to fertilize them in the end. Then, with the animating knowledge of what our society has been, what it now is, and what our hopes desire it may be, let our watchword be "Onward and upward." And as the great chieftains and mighty intellects of ancient Rome by their abilities in the forum and their prowess upon the fields of war bequeathed to their fellow-citizens their highest and proudest distinction—*a citizen of Rome*—so, upon the peaceful plains of science and within the walks of our own specialty, with every energy and every heart enlisted under her banners, may similar honors be earned and distinguish "*a member of the American Dental Association.*"

SECTION VI.

Pathology, Therapeutics, and Materia Medica.

Syphilitic Teeth.

Paper by A. G. FRIEDRICHS.

THIS subject is one in which I have always taken an exceeding interest. From the time I began the study of my profession I have taken advantage of every opportunity to satisfy myself as to whether there were certain deformities that were characteristic and diagnostic of syphilis, recognizing, as I do, the importance and value of such aids in diagnosing the more obscure forms of this dreadful disease. I have read Mr. Hutchinson's address, but I must confess that the descriptions which he has given of what are the special deformities arising from syphilis are rather vague and of too general a character, and can be applied to a great variety of deformities associated with interstitial keratitis.

This question occasioned much discussion at the last meeting of the International Medical Congress. Dr. Magitot read an article at that meeting wherein he stated that the deformities ascribed by Hutchinson to syphilis could not be attributed solely to that cause. Mr. Nacati also has said as much, and in a very interesting work has shown that these deformities should rather be attributed to rachitis than to syphilis. In my own practice I have come across deformities in the teeth of children resembling the deformities described by Hutchinson, where there were no traces of syphilis. I have now three cases under observation where there is no history of syphilis; the teeth are of the same character as we find associated with interstitial keratitis. One of these cases has a general inflammation of the eye with loss of mobility, teeth with so-called syphilitic characteristics, but no taint of syphilis. Many more cases came under my observation while a student at the Charity Hospital, New Orleans,—some with syphilitic history, some without; and in both classes presenting quite a variety of deformities.

The diagnosis of syphilis, as you all know, requires at times the utmost skill, as its symptoms may counterfeit and combine the symptoms of various diseases; so that frequently we are only allowed the bare suspicion. Besides, the patient, when conscious, will often place every obstacle in the way to mislead us, willing to acknowledge any other of all the ills to which flesh is heir in preference to syphilis; and in many instances, too, patients, inheriting the disease, are themselves unconscious of their infection.

By the foregoing remarks I do not wish to convey the impression that syphilis does not occasion deformities; but to assert that these deformities are unmistakable or invariable evidences of congenital syphilis is, in my humble opinion, too absolute a statement. The experience of others, as well as my own, warrants the statement that as inherited syphilis is a disease affecting the nutritive processes, thereby interfering with the development, not of the teeth alone, but of the whole organism, it could of itself be a cause; but independent of it any other condition that would likewise arrest development—rachitis, etc., for instance,—would produce very similar results.

Mr. Hutchinson asserts that the only teeth to which he could venture to attach much importance are the upper central incisors of the permanent set. Now, as syphilis occasions an interference with the general development, it appears to me that, as this morbid condition antedates birth, the temporary teeth should present deformities as characteristic as those of the permanent set. Why, then, when all the other teeth, both temporary and permanent, are of similar formation and exposed to precisely the same influences during the whole period of their development, should only the upper central incisors of the permanent set present characteristic peculiarities?

I believe they result from the diseases of early infancy, which modify the nutrition of the dental germ. What is the disease? Is the disease diathetic, and does it give a peculiar shape to the malformations of the teeth? In my opinion, there is no special diathetic malady which produces a specific malformation of the permanent incisors. Any grave sickness in early infancy will produce this result. Neither syphilis, nor rachitis, nor chronic enteritis has any different influence. Hereditary syphilis and rachitis cause malformations of the teeth, not as syphilis or rachitis, but as a cachectic condition. It is as the result of a depraved nutrition, modifying the development of the dental germ, that syphilis produces the

alterations of the permanent incisors, and not as a diathetic disease. Consequently, this modification of the dental organisms is occasioned by all the cachectic maladies of infancy. Similar disturbances to those that occur in the dental germ, occur also in the nails, the hair and the bones. The nails become thin, then thicken, presenting the ridges attributed by Bean to dyspepsia, and which, with the return of health, disappear. The bones enlarge at the margins of the epiphyses, and rarefy, tending to osteoporosis. They soften, bend easily, and can not even support the weight of the child, so that it would rather lie abed, even after it has already begun to walk. The dental germs are subject to the general law and they become altered with the rest of the economy, whatever the cause which affects the general nutrition of the patient. They suffer when all suffer.

Buchat, after a minute and careful analysis of one hundred and fourteen cases of dental malformations, states that when observed in association with hereditary syphilis, the deformity was due less to the syphilitic impression than to the influence of a cachectic condition; also, that of the one hundred and fourteen cases only eight could be attributed to syphilis.

When we consider with what delicacy and care we must conduct the examination of a case where syphilis is suspected, because rashness may not only cause ill-feeling, but may blight the life of the sufferer, we can readily appreciate what difficulties beset a physician in his endeavor to reach a correct diagnosis; so that it is only in a few cases, where parents acknowledge their syphilis and that of their children, or where the physician has had the child under his observation and followed it from its infancy, that any but the merest hypotheses can be made. To regard as syphilitic teeth the teeth of children about whose early life nothing is known, or of children who were not syphilitic but whose fathers once had syphilis, or children whose ancestors were not known but were thought to have been syphilitic, upon the supposition that their parents may have been liable to acquire syphilis, may be very excellent to satisfy some pet theory, but I fear would rather be an obstacle to the progress of science. All hypotheses should be laid aside and facts alone should be brought forth—demonstrable facts. All that is doubtful should be purged from our records or set down in their proper place and called by their proper names,—suppositions, suspicions, assertions,—but not facts. Then will we all accept them with the proper reserve. I fear, with regard to syphilitic teeth, that there has been too much

speculation. The alterations of the teeth are neither more nor less, in my opinion, than the result of a cachectic state. Syphilitic, rachitic, scrofulous, intestinal, or pulmonary cachexiæ all interfere with the nutrition of the teeth, as well as of the skeleton in general; likewise, in very young children, a long and painful illness, an eruptive fever, associated with serious complications, or a chronic enteritis, will stop the development of the osseous tissue, causing softening of the bones, swelling of their extremities, rarefaction of their epiphyses, and alterations in the teeth.

Similar alterations in the osseous structures can be artificially produced upon birds by suppressing all the phosphates of lime from their food. The same result was obtained in a litter of pigs by premature alimentation and confinement in the dark.

Hereditary congenital syphilis or syphilis acquired shortly after birth can be the cause of dental deformities, but these deformities can also be occasioned by a grave illness; for instance, any chronic disease of the intestines, stomach, or lungs, that may occur in early life. It is this systemic depravity which causes this disturbance in the regularity of the movements of the bony nutrition. The specificity or the diathesis of the case is worth nothing. A disturbance of nutrition is the starting-point in all these alterations. Therefore, while the deformities claimed to be diagnostic of and peculiar to syphilis can result from syphilis, they can likewise be the result and more often *are* the result of a depraved or weakened physical condition.

SECTION VI.—Continued.

Treatment of Pyorrhea Alveolaris.

Paper by A. W. HARLAN, of the Section.

ON account of the uncertainty in the mind of the dental specialist with reference to the treatment of that variously named and illy defined disease, known as pyorrhea alveolaris, Riggs's disease, alveolitis, phagedena pericementii, etc., the writer desires to offer a few suggestions relating thereto, which may tend to give more confidence to those who have had but little success in their efforts to restore to health the tissues which are so often ravaged beyond repair. It will not be necessary in this report to say anything of the etiology of the disease under discussion, beyond the expression of the belief that it is infectious, and that micro-organisms are at least partially responible for the disastrous results which are sure to follow if it is not checked before the complete destruction of the alveoli.

It is now nearly two years since I became convinced that the methods of treatment advocated by various writers, including that of Dr. Riggs himself, were not the most beneficial to the majority of cases presenting themselves. At that time I was engaged in making some experiments with the essential oils and eucalyptus globulus, to determine their value as antiseptics. During these investigations it occurred to me that iodide of zinc, which then, as it does now, occupied only a few lines in the "Dispensatory" and works on medical chemis try and therapeutics, might be the remedy which would rob the hydra-headed monster of its terrors for the dental surgeon. I procured a sample and at once made solutions of xii. and xxiv. grs. to the ounce of water, and waited for the first case. It soon came. My first experience with it was in the fall of 1881, and the first case was that of a lower central incisor; the gum was loose two-thirds of the length of the root on the labial surface, pus exuding on pressure, and the alveolar process wasted half the length of the root; there was little, if any, deposit on the labial surface of the root, and no salivary calculus on any of

the teeth, except the buccal surfaces of the superior third molars. I carefully cleansed the root and excised the edge of the bone, then dried the pocket, after washing it out with water, and injected into it three drops of the first-named solution. The patient was directed not to squeeze the gum, but to return in four days, and let me see him. When he returned, I dried the gums and applied pressure, and found scarcely any discharge. I repeated the former treatment, omitting the scraping and probing, and when he returned the second time there was no discharge whatever. The pocket had commenced to fill up, and the gum was beginning to re-attach itself to the tooth. The patient returned again after eight days, and there remained hardly a trace of the disease. To all intents and purposes it was cured. After the lapse of more than twenty months the gum remains firm, and is of normal color, without depression or any external evidence of having been diseased at all. The remarkable manner in which this remedy exerted its beneficial influence in this case caused me to practically discard all other therapeutical agents in the treatment of pyorrhea, except as shall be hereafter mentioned. I found from a study of cases that when a patient was suffering from an acute attack of pyorrhea the pockets should first be packed with iodoform and eucalyptus, iodoform and oil of cinnamon, or be thoroughly syringed with a one to three-grain solution to the ounce of water, of chloride of alumina, which is a good disinfectant and astringent, and also an excellent bleacher for discolored, pulpless teeth; but the method of using it in such cases will be dwelt upon in the discussion on operative dentistry. This method of treating the pockets in acute cases relieves the patient of present suffering, and also reduces the swollen gums to their normal size. In three or four days the sanguinary deposits may be removed and the edges of the alveoli scraped or burred off. The pockets should then be syringed with peroxide of hydrogen, which will cleanse them perfectly, and at the same time bring into direct contact with the diseased pocket a germ-destroyer and antiseptic not less potent than any which can be named. After drying the gums, the pockets should be injected with the previously named solution of iodide of zinc, one, two, or three drops, or more, in each pocket. When the patient returns on the fourth day the gums must be dried carefully, and a fine cone of cotton or bibulous paper be moistened with peroxide of hydrogen and gently pressed into each pocket. If there should be any effervescence, it demonstrates the presence of pus, and each pocket must be again injected with the iodide of zinc solution. Peroxide of hydrogen, for

all clinical purposes, is a perfect detector of pus, even better than the microscope, because those not familiar with it can see with the naked eye the bubbling produced by H_2O_2 when brought into contact with pus.

In chronic cases, after the removal of the diseased bone surgically and the cleansing of the roots are effected, the pockets should be syringed with H_2O_2, to be followed by the injection of the xxiv. gr. solution of iodide of zinc in precisely the same manner as has been heretofore described. In very bad or almost hopeless cases, I use even a stronger solution, grs. xlviii. to the ounce; and when the gingival margins present a ragged border or cone-shaped slit, I apply the pure granular iodide to the edges of the slit once in three days, and soon find a perfect restoration of the normal festooning of the gingival margin. The injection into the pocket is to be repeated every fourth day. The length of time required for the cure of cases where two to four or five teeth are involved, varies from twelve days to four or five weeks, supposing the patient to be in ordinary good health. In those cases where constitutional treatment is required each must be met according to the indications, and the intelligent practitioner will decide for himself just what is needed during the period of local medication. The worst case that I have had during the past two years was where sixteen teeth were diseased, and it required constant care from March 26 to June 12, 1883. It was a case of three years' standing, and had been under the care of two gentlemen before it came to me, and the patient thought her gums were worse after leaving them than before treatment was commenced.

Iodide of zinc has long been used by medical practitioners, in the form of a syrup for internal administration, and as an ointment externally for strumous inflammation and enlargements, chorea, etc. It is made by digesting four parts of iodine with a little more than one part of granulated zinc and twenty parts of water, until the liquid has become colorless. On evaporation it crystallizes and is ready for use. It is freely soluble in water. I present herewith a comparative table of the relative value of antiseptics and germ-destroyers, which as all may see places iodine almost at the head of the list.

This table is the result of a large number of experiments by M. Miguel, of the Observatoire de Montsouris, and shows the minimum quantity of the several antiseptics capable of preventing the development of germs and of adult bacteria in a liter of bouillon:

	Gms.		Gms.
Peroxide of hydrogen	0.05	Arsenious acid	6.00
Bichloride of mercury	0.07	Sulphate of strychnine	7.00
Iodine	0.25	Boracic acid	7.50
Chloride of gold	0.25	Arsenite of soda	9.00
Bichloride of platinum	0.30	Hydrate of chloral	9.30
Cyanhydric acid	0.40	Salicylate of soda	10.00
Bromine	0.60	Caustic soda	18.00
Chloroform	1.00	Borate of soda	70.00
Bichromate of potassa	1.20	Chlorhydrate of morphine	75.00
Ammoniacal gas	1.40	Alcohol	95.00
Thymic acid	2.00	Iodide of potassium	150.00
Phenic (carbolic) acid	3.20	Marine salt	165.00
Permanganate of potassa	3.50	Glycerin	225.00
Acetate of lead	3.60	Sulphate of ammonia	250.00
Alum	4.50	Hyposulphite of soda	275.00
Bromo-hydrate of quinine	5.50		

Corrosive sublimate has the most powerful effect on bacteria; an aqueous solution of 1 in 20000 kills the spores of bacilli in ten minutes. A solution of 1-5000 is thus a certain disinfectant, even when the time of exposure is very short. Koch finds that an aqueous solution of corrosive sublimate of 1-300000 puts a stop to the germination of bacterial spores. Sulphurous acid does not rank high as a disinfectant. Bacteria clinging to dry objects are killed after twenty to thirty minutes exposure to an atmosphere containing 1 volume per cent. of sulphurous acid. Spores of bacillus subtilis and bacillus anthracis are still capable of development after 96 hours exposure to an atmosphere of 5 to 6 vols. per cent. of sulphurous acid; even when moist they are very hard to kill with it. It is thus a very untrustworthy disinfectant, all the more so because it has little power of penetrating compact masses or bundles,—(Wolfhügel, Buchholtz, Schotte and Gärtner, Koch, Buchner). Carbolic acid in five per cent. solution will kill the spores of the anthrax bacillus in twenty-four hours. A three per cent. solution, however, will not do so in the same time. A solution of 1-400 checks the development of bacterial spores. Vapor of carbolic acid at ordinary temperatures is without effect; at 55° C. it kills the spores in two or three hours (Koch). Chloride of zinc in five per cent. solution has no effect on anthrax spores, even when they have lain in it for a month (Koch). Iodine, bromine, and chlorine are far more active than sulphurous acid. Bacilli cease to grow in the presence of iodine in the proportion of 1-5000, and of bromine 1-1500. Iodine water and chlorine water kill spores in one day; a five per cent. solution of chloride of lime in ten

days. Benzoic acid, sodium benzoate, potassium chlorate, and quinine have little effect on spores. The following substances, even in dilute solution, have a restraining influence on bacterial development: allylic alcohol; oils of mustard, peppermint, turpentine, and cloves; thymol, chromic, picric, hydrochloric, and salicylic acids; quinine. The effect is perceptible in solutions of 1-300000 for oil of peppermint, of 1-800 for quinine, of 1-75000 for oil of turpentine. All disinfecting agents should be used in aqueous solution. In alcohol or oil they are either inactive or enfeebled. Bacillus spores still retain their power to germinate after lying for months in absolute alcohol. Pure oxygen is known to kill bacteria outright.—*Page* 75, 275-8, *Zeigler.*

This system of treatment, based on the primary injection of H_2O_2 into the pockets as a ready method of cleansing them and at the same time furnishing nascent oxygen to destroy the unclassified micro-organisms there present, and the subsequent injection of the zinc iodide, for its well-known stimulating and protective effects on the reparative material exuded, which is always ready for organization after being thus carefully protected, renders it almost certain that if careless probing or syringing of the pockets is prohibited, and the mouth is well cleansed with an antiseptic wash, a reproduction of lost tissues may be confidently anticipated.

In conclusion, permit me to say that this remedy, when used faithfully in conjunction with peroxide of hydrogen, the most valuable germ-destroyer known up to the present time, arms us so well that I believe with expert handling of the probe to discover the concealed pocket, skillful removal of all deposits and edges of diseased bone, conjoined to an exact knowledge of constitutional needs, that we no longer need feel dismayed when brought face to face with a genuine case of pyorrhea alveolaris.

DISCUSSION ON DR. FRIEDRICHS' PAPER.

Dr. Atkinson: The discussion of this subject reaches to the foundation of the change of nutrient activity from health to a diseased form, and involves all the differences of the syphilists and the anti-syphilists from the earliest time of pathological discussion.

It is very clear that the paper and nearly all the references in it are of the mass character that reach at presentments that are competent to be observed by the unassisted natural vision, from which we cannot explain any of the changes that take place, nor settle

the difference between the appearance of a tissue that is under what is here called cachexy or syphilis, forgetting entirely that there may be a syphilitic cachexy.

If you will look closely into some of the statements of the paper, you will see that they are gratuitous. It is said that the syphilitic virus holds its court in the embryo. If it holds its court in the embryo, this paper may be true when it says, "There is no distinctive characteristic in the temporary teeth."

I think the writer really comprehended what he said, but did not say what he meant,—that there was no syphilitic characteristic manifest so far as his observation had gone in the temporary teeth; but that there are characteristics in the temporary set is absolutely known, and by them we are enabled to distinguish the temporary from the permanent set, and if we wish to see these differences and discuss them, we at once go outside of the range of mass observation and must be acquainted with the histology of the tissues to be masters of the subject.

The entire mass view tells us at once that we are only beginning to comprehend what function is, for the very reason that because there is such a great variety of molecular changes that enter into the constitutions of different individuals the standard of health is not a unit. The standard of health is different for every individual and we can only generalize upon those questions if we deal with them in a mass way. Until we know the molecular changes whereby the food is converted into the tissues that constitute the organs of the body, we will simply be striking in the dark and unable to satisfy our own minds of the ratiocinative process through which we go in the examination of particular cases in order to arrive at what we call a diagnosis; and probably the greatest obstacle in the way of our proper advancement is, that we have not been willing to be rigid in scrutinizing our own mental processes, so as to know when we are satisfied with our examination and with the judgments that we pronounce, so that we could religiously say that we did know what we were about.

Dr. Peirce: The paper just read, it seems to me, has dealt with the facts as we have them presented to us by physicians and by the literature of the day. It is mass observation, it is true, but from mass observation we can learn a great deal.

It is well known to the dental profession that certain characteristic impressions prominent upon the permanent teeth are designated by the medical fraternity as syphilitic markings. This we have

heard affirmed from the time we entered the profession whenever these peculiar abnormal conditions were a subject of conversation with a member of the medical fraternity. From observation dentists have been taught that other conditions will produce these same appearances and therefore it is unjust to attribute them always to the one specific disease. For that reason I was rejoiced in listening to the paper. I felt that it had taken up the subject and presented it in an intelligent manner to this body.

Observing practitioners recognize the fact that a child who has suffered for the first six months of its life, or during the period of the eruption of the deciduous teeth, with what is termed interrupted dentition,—going through a series of convulsions with every tooth erupted,—must have the permanent teeth very badly developed. It may have markings on the permanent teeth to correspond with those that have been termed syphilitic.

If a child is placed in my chair with the permanent teeth erupted and pitted, I can say to the mother, "This child had some severe illness during such or such a period of its infancy." If the child was ill from birth all through the first year or especially from the fifth month up to the end of the first year, you will find the central incisors and the first permanent molars are imperfectly calcified, with lines or pits over the masticating surfaces of the molars and across the labial surfaces of the incisors. You will probably find the inferior incisors broad at the cutting edge and constricted towards the neck, and you will usually find the markings prominent which are laid down by Hutchinson as belonging to syphilitic teeth.

I have, I think I can safely say, twenty patients in my practice who have just those conditions of the teeth that Hutchinson portrays in his diagrams as being due to syphilitic taint, but I am satisfied that if there was any syphilitic influence in these cases, it dated back several generations. Whenever we have an abnormal condition during the calcification of the permanent teeth that is sufficient to interfere with nutrition, we have the permanent teeth deficient in the quality and quantity of enamel and dentine. This is all, as Dr. Atkinson has said, mass observation. If we go closer to the histology of the teeth we shall find imperfect calcification throughout the whole tooth, provided mal-nutrition lasted during that period.

If a child has had no ill health until the end of the first or some time during the second year, and then is attacked with scarlet fever and is ill for six weeks, you will find the permanent incisors and

first molars perfect for some distance from the cutting edge or grinding surface towards the gum, and then you will find a row of pits around the teeth, while below these again the teeth will be perfect quite to the neck or gum, showing that nutrition was normal up to the period of the attack of scarlet fever, abnormal during the continuance of the disease, and again normal after that until the completion of the crowns.

Wherever you find mal-nutrition, whether from scarlet fever, measles, whooping-cough, or any other condition, there you will find that handwriting on the teeth.

If no interruption to nutrition occurs until after the crowns of the incisors are fully calcified, but does take place while the second permanent molars are in process of calcification, then the same markings will be found on these latter teeth, indicating the condition of health of the child during that time.

If any one is observing and notes the correspondence between health and development, by a little inquiry he will soon learn to say to the mother, "This child was sick during certain months or certain years of his or her age." I can bring to mind now a child which came to me with the second permanent molar defective, and I said to the mother that the child at the age of four years suffered some systemic disturbance. She said, "Yes, he had scarlet fever at four years and was very ill for months." There the second permanent molar was badly marked; so I say, by a close observation we arrive at a knowledge which enables us to designate within a few months the age at which the child suffered from ill health sufficient to interfere with calcification of the tooth-structure.

Dr. Atkinson: Dr. Peirce rather gives the go-by to the idea that we must understand the minute elements of an organ to comprehend whether it is in a healthy or diseased condition. He has completely confirmed what I wish to say. Being acquainted with the law of the evolution of the teeth enables us to say that at such a number of months, in a general way, the child had some sort of skin disease. This is simply the knowledge of the mischief, but not of the seat of the mischief. I only desire to stimulate the young men to study minutely embryology and histology, so that they can get at the comprehension of these things. I have seen as fine structures of teeth as I have ever known, with this exception,—marked with these lines across them,—where the cause was simply interruption of the process of the deposit of lime-salts that formed the enamel and the dentine, at the time they were in a soft condition. I simply wanted to

make this point in advocacy of getting at bed-rock,—the foundation principle for which this body was established,—that we might be able to scientifically justify our procedure with the cases that come before us.

Dr. Peirce: There is no difference in sentiment between Dr. Atkinson and myself, excepting that I felt that he did not appreciate the object of the essayist, which was simply, as I understood the paper, to correct an erroneous impression in the profession. The writer did not attempt to go into histology at all.

I fully agree with Dr. Atkinson that we are coming to be better instructed, by getting deeper down, or nearer to the beginning of things. Yet the paper was written to correct a superficial impression, and I think it has done it very admirably; at least, it has brought the subject up in a very intelligent manner before this body.

Dr. Darby: I have been much interested in the paper just read. It seems to me that the value of the paper lies in the fact that it endeavors to correct a general but erroneous impression. The impression is too general that the deformed teeth which we frequently meet are the so-called Hutchinson's syphilitic teeth. Physicians often ascribe a syphilitic origin to teeth the deformities of which are not due to such taint, and dentists make the same blunder. Some years ago a physician of prominence came to my office with a child, accompanied also by its mother. He called me into another room, and said to me that I should be careful in questioning the mother about the character of the child's teeth, for he thought them to be syphilitic teeth. I had known both father and mother for years, and believed them both entirely free from anything of the kind. The teeth were simply malformed; the sixth-year molars and incisors were alike defective in development, showing that at the time of their calcification there had been imperfect nutrition. The physician had evidently been tracing back the ancestry of the child, hoping to find syphilis in one or both sides of the family.

I am very glad that Dr. Friedrichs directed special attention to and emphasized the difficulty of correct diagnosis and the mistakes that are so frequently made by medical men and even by dentists. We are entering a delicate sphere when we question parents upon the supposition that their children's teeth bear marks of syphilis inherited from them. In my opinion, we rarely meet with syphilitic teeth in our practice.

One of our prominent Philadelphia dermatologists has been work-

ing up this matter of late, and by the aid of my assistant has obtained plaster models of many cases from among the poorer classes. He has been exceedingly careful to take none except such as he is sure proceed from syphilitic parentage. The value of his investigation lies in the fact that the evidence is indubitable.

Dr. KINGSLEY: What is the appearance of the teeth in those cases which are undoubtedly congenitally syphilitic? Is there any peculiarity of the teeth in those cases?

Dr. DARBY: I cannot say they are materially different from many of the malformed teeth that are frequently met with in practice, except that the teeth are more stunted in development. Instead of having the notched or serrated edges which are so frequently seen in cases of interrupted nutrition, they have a more stunted and undeveloped appearance throughout.

Dr. KINGSLEY: It has been my fortune during the last twenty-five years to have seen a great many cases of the children of those who were undoubtedly syphilitic. But in no single instance have I seen any markings upon the permanent teeth, such as have been described as syphilitic markings. There has been no peculiarity in those teeth in any cases that I have seen, whereby I could pronounce positively that the patient was congenitally syphilitic.

I have long since ceased to place any faith in the idea that the markings which we so often hear called syphilitic markings, by the medical profession, are due to syphilis in any case.

Dr. ABBOTT: I have for fifteen years looked almost in vain for cases of what would seem to me examples of syphilitic teeth. The kind of teeth which Dr. Peirce has described, of which we see so many, are far from them, in my estimation.

Some two years ago I discovered a case in a child about ten or eleven years of age. The teeth were exactly what Mr. Hutchinson describes. At the points of the central incisors they were a sixteenth of an inch narrower than towards their necks; instead of growing broader they became narrower toward the cutting edge. That is one of the special peculiarities of syphilitic teeth, and not this pitting that is observed in so many cases, which is due to a want of nutrition and a cessation of the formation of enamel at a certain time during the process of calcification.

Dr. BARRETT: Whether or not certain marks are indelibly impressed upon the teeth of children born of syphilitic parents is an unsettled question. I have paid some attention to the subject, and have watched as carefully as possible to see whether I could detect

the traces that have been charged upon syphilis. In one family that fell under my observation, and whose physician informed me of the condition of affairs, the older children, who were born previous to a syphilitic infection, had teeth that were regular and comparatively sound, but those born since that epoch have teeth which are very irregular and malformed in shape, the substance of the tooth-bone very soft, and the whole denture very liable to decay and disease. This does not necessarily prove that syphilitic infection caused the latter condition, because the peculiar shape of the so-called Hutchinson's teeth is not present. If there be any marks they are of a different character.

I have seen other cases and am satisfied that if they are from syphilitic infection, if such infection does affect the shape, consistence, color, or contour of the teeth in any way, the changes so caused are not at all uniform. So far as my own observations extend there is no such thing as a true syphilitic type of teeth. That syphilis may leave its impress upon the teeth is quite probable, but I do not believe it has as much effect upon them as many cases of eruptive fevers occurring during the various stages of their calcification.

This summer it has been my fortune to make a study of a large number of skulls of pre-historic American races. I looked especially for syphilitic marks. It is a disputed question whether syphilis was present in the pre-historic races of the Old World before the advent of modern civilization. It is also disputed whether or not syphilis was present previous to contact with the whites upon this continent, but I believe the preponderance of testimony is that it did not exist. In all the skulls that I examined there was but one which showed the least trace of syphilitic affection, and in that there was good reason to suppose it was an intrusion, and had found its way into the burial-place of the pre-historic people at a later day.

DISCUSSION ON DR. HARLAN'S PAPER.

Dr. Bödecker: I have for several years been very earnestly investigating this disease, but have come to a different conclusion than that formed by the essayist. It is as yet an unsettled question that bacteria are the source of inflammation. I am of the opinion that bacteria are rather the result of an inflammatory process and not the cause. Bacteria derived from other sources of inflammation are exactly the same as those derived from pyorrhea alveolaris; at least they appear to me to be exactly the same.

I do not believe that the theory that the germs are directly the cause of an inflammatory process can be maintained, but, on the other hand, wherever these germs are allowed to grow, inflammation will prosper. There is no doubt about that, and therefore antiseptics in pyorrhea alveolaris are of the greatest service; but they should be antiseptics of a non-irritating character. We have antiseptics, such as chlorine, iodine, and bromine, that are exceedingly irritating to the tissue, and by excessive use secondary inflammation is often induced, or the primary prolonged.

In the treatment of pyorrhea alveolaris, if we first use iodide of zinc, which I have been using for a number of years, it is exceedingly valuable, but if continued too long, in some cases it may keep up the inflammatory process, and will not lead to a cure so quickly as some other agents which are of later discovery. For the last eighteen months I have been using a saturate solution of tartrate of chinoline. This preparation is obtained from coal-tar and is exceedingly astringent, non-irritant, and a very admirable antiseptic. I have obtained results with this salt that are simply marvellous. I have seen teeth which were so loose that I could have removed them with my fingers, which by the use of this remedy were within four or five weeks rendered perfectly tight in their sockets. I exhibited one of these cases at the clinic of the New York First District Dental Society two months ago. Another remedy is a solution of boro-glycerole, which has given me a great deal of satisfaction, and I believe it is in certain cases exceedingly valuable. But the tartrate of chinoline I would recommend as the best astringent remedy in this disease.

The treatment which I have generally pursued is, in the first place, to remove all calcareous deposits which are within easy reach without lacerating the gum; I then take a very thin but stiff steel instrument, around which I wind a piece of cotton rather tightly, dip it into the iodide of zinc and rub round the neck of the tooth thoroughly, so as to wipe away all foreign matter that is loose.

In this way I make two or three applications with iodide of zinc, and then begin with the saturated solution of tartrate of chinoline. I use it in the same manner, with cotton wound around a thin instrument, wiping away every trace of foreign matter under the gum.

Dr. Darby: I would like to say one word about one of the remedies Dr. Harlan has mentioned in his paper—that is, iodoform. He has spoken of it as an antiseptic. It is both antiseptic and anæs-

thetic, and is one of the best remedies we have for toothache. It has one serious objection, however, and that is its odor. When that objection to it is removed, it will occupy a very prominent place in our list of remedies.

A gentleman who tells me he has had very large experience in the treatment of pyorrhea alveolaris says he has been in the habit of using pulverized nitre. He inserts it between the gum and the tooth, and allows it to dissolve there. I have never used it, but simply give you the testimony of one who says he has had great success with it.

Dr. Abbott: The best remedy I have ever found in this disease is a very carefully handled, properly adapted instrument. I have never yet found anything that will replace real hygienic operations—that is, operations which will secure a proper cleansing of the roots of teeth of the irritating substances that collect upon them. No remedy will ever take its place. If these are *removed*, I will guarantee that in nine cases out of ten the disease will disappear without any antiseptics, disinfectants, astringents, or anything called medicine; and unless this be done all the remedies known to the medical profession will not effect a cure.

Dr. I. P. Wilson: Did I understand Dr. Harlan to say that he succeeded in perfect restoration of the lost tissues of the alveolar process and of the gum, and that they firmly united with the teeth again?

Dr. Harlan: I said the restoration of lost tisse was almost certain to follow this careful, persistent, systematic treatment. It there is cure there is restoration.

Dr. Atkinson: I observe that there is always a disposition to push to the ultimate every question and there is a shyness on the part of those who reply to meet the demand. The last question brought me to my feet. Are the hard structures reproduced? That brings out a principle of nutrient activity in production and maintenance of tissue, which, if understood, would answer all these questions satisfactorily.

The aphorism is this: reproduction follows the same order of activity as original production of the tissues of the body. I will show any doubting man reproduced alveolar process, and if he were not aware that he was examining for reproduction he would not be able to distinguish between the parts that were original and those that were of the reproduced material.

Cleanliness is akin to godliness and godliness is obedience to law,

and obedience to law must be spontaneous obedience. If we could get at such a condition as would fulfill all the functional requirements of the body there would be no deterioration anywhere.

It would be more profitable to ask questions and get direct answers than to have long preachments on this and that. Statistics are well enough if they are faithfully made. I do not care how faithfully they are made, however, if there is not intelligence enough in the observer to interpret them, they are but worthless ceremonies and dead weights upon you; they are darkness and not light. How many men here could answer the question—What is inflammation? I have never been in a medical convention where there was one who could answer it except by repeating some old red-letter definition. Redness, heat, swelling, pain; that is all you could get out of them and they ring the changes on those. We can have any one of them and not inflammation, and we can have inflammation without one of them at all events,—redness. I have never seen epithelium reproduced. I have never seen muscle reproduced. I will ask any histologist if he has. One histologist that I love dearly says he has. I have seen nerve and bone reproduced so that the finest microscope could not detect the difference.

Dr. Abbott: I am sorry our friend did not go on in the direction he was going and follow back the changes in the tissue from its normal state into the condition of inflammation again. That is a very interesting process. Around the root of the tooth there is an inflammatory condition going on, brought about by some irritating substance that is located upon or around its root. What does that inflammatory condition consist of? Before a protoplasmic, or rather a bioplasmic mass is converted into any special tissue, it consists of an indifferent or embryonal mass. Nature makes out of this mass the different varieties of tissues required. When inflammation of a part is produced, it is the reconversion of the tissues of that part to their indifferent or embryonal condition, and as the inflammation subsides, the proper tissues are again formed.

Dr. Daboll: I think we do not make a sufficient distinction in the different expressions of this disease. In this disease we have various forms of expression. It may be the same disease all the way through, but we observe constantly differing conditions.

In the last ten years I have had more or less experience in the treatment of this disease but have never been able to reproduce the gum or the alveolar tissue where there has been absorption and a recession of the gum. In cases where there was an exudation of

pus and a loosening of the teeth, where pockets were formed by the side of the root, and there was no recession of the gum, I have been able to restore the tooth to its normal condition, with restoration of the alveolar process, because we had the condition to admit of it. I do not think there is any question but that we can restore the alveolar process where we have enough of the periosteum left. I have been very much interested in the discussion of the papers and hope that we have got some new remedies which may help us in the treatment of this disease, which has come to be a very common one for dentists to deal with.

Dr. Peirce: I want to congratulate this Association on an evidence of progress. We have discussed this paper, and Riggs's name has not been mentioned. A few weeks ago a lady came to my office in quite an excited condition. She said she had been spending three weeks in New York, and had occasion to call upon a dentist there who told her she had Riggs's disease. She asked me where she had got it. She said, "I have not seen Riggs, and I don't know where I could have gotten the disease."

SECTION V.

Anatomy, Histology, and Microscopy.

Action of Arsenious Acid upon Dentinal and Pulp Tissue.

Paper by C. F. W. Bödecker, of the Section.

THE action of arsenious acid upon the dental tissues has for a long time been a disputed question, and the changes effected by the poison when applied to the cavity of a tooth were thought to be confined to the pulp-tissue; although Dr. Clowes, of New York City, showed, several years ago, that an application of arsenious acid to the dentine of a tooth far from the pulp, would lead to the same result as if the agent was placed directly upon the organ, the only difference being that its action in the former instance was not so rapid.

In 1879, Dr. A. Witzel, of Germany, published an extensive work on the diseases of the dental pulp. In this he claims that a pulp, if not too much inflamed, can be treated with arsenious acid, its coronal portion amputated, and the remaining pulp-stump preserved. This doctrine has created a great deal of controversy in this country, although in Germany it seems to have been almost universally accepted. I have followed this line of treatment in sixteen cases, in an experimental way, selecting teeth which I was able to examine from time to time. I should not have used this method in so many cases, had not the first experiment misled me in such a manner that at the present time I am unable to explain it.

The case was as follows: in November, 1879, a healthy young lady, over eleven years of age, presented herself for the correction of an irregularity. The front teeth of both the upper and lower jaws were overlapping each other, and although the arches were pretty well developed there was not room enough for thirty-two teeth. I therefore decided to remove the sixth-year molars as soon as the second molars began to make their appearance. Three of the sixth-year molars were well preserved, but the left lower one was largely

decayed, and gave the patient trouble whenever anything sweet or sour entered the cavity; but the pain ceased as soon as the irritant was removed. Pressure in the vicinity of the pulp-chamber produced no pain. All these were signs that the pulp was in a tolerably healthy condition and admirably adapted to an experiment with arsenious acid in the manner described by Witzel. The details of the operation, concisely stated, are as follows: After the cavity has been cleaned of decay, the pulp is exposed and an application of

℞.—Acid. carbolic., 1.50 gms.
Tinct. aconiti rad., } āā, 0.50 gms.
Aquæ menth. pip., }
Glycerinæ, 0.20 gms.
Acid. tannic., 0.30 gms.
Ol. menth. pip.,
Ol. caryophylli, āā, gtt. xxv.—M.

is made for about five minutes, the arsenious acid paste is laid directly upon the pulp, and the cavity is hermetically sealed. After twenty-four hours the temporary plug is removed, a sharp, new bur which has been disinfected is put into the engine, and with a few quick revolutions of the bur the coronal portion of the pulp is amputated. The pulp-chamber is then syringed with a five per cent. solution of carbolic acid in water until the bleeding has ceased, when the cavity is dried, the pulp-stumps touched with the carbolic acid and tannin solution mentioned above, then with a carbolized solution of mastic, and still after this with a pulp varnish composed of collodion, gutta-percha, and a little carbolic acid. The pulp-stumps are then capped with carbolic acid cement, the formula of which is as follows:

℞.—Acid. carbolic., 0.50 gms.
Alcohol. absolut., 0.20 gms.
Aquæ destillatæ, 4.00 gms.
Glycerinæ, 2.00 gms.—M.

To this add an equal volume of the zinc chloride used in oxychloride fillings; and to a sufficient quantity of this mixture add oxide of zinc, and mix to the consistence of thick cream.

Six months after the operation I saw the patient and removed the four teeth mentioned above. On opening the roots of the left lower molar, to my surprise, I found the amputated pulp-stumps alive. Without delay they were prepared for the microscope and examined. The nerve-fibres of both these specimens showed nothing abnormal;

the connective-tissue of the pulp had retained its myxomatous character, and no sign of a former inflammatory process was observable, except where the pulp had been cut in the amputation.

This result induced me to try the same procedure in fifteen other cases, although microscopical examination of pulps treated with arsenious acid and extirpated with the broach had given evidence of the destruction of the medullated nerve-fibres as far down as the apical portion of the pulp. These pulps, however, without exception, had been removed on account of pulpitis, and I was, therefore, unable to determine whether the degeneration of the nerve-fibres was the result of the application of arsenious acid, or of a preceding inflammatory process.

The results obtained from the other experiments I made with Witzel's method of amputation, were, however, not so encouraging as in the case mentioned above. I have seen eleven of the remaining fifteen cases experimented upon since last October, but the pulp-stumps in every one of them had died, although the external appearance of the teeth was perfect.

The above-mentioned facts make it evident, therefore, that the minute microscopical examination of the changes effected by arsenious acid is to us of the greatest importance. They can best be studied in healthy or superficially decayed teeth of human subjects, or in the teeth of such animals as can be easily experimented upon. In all cases, therefore, a mode of procedure must be chosen, and the line of study is necessarily experimental, and should extend over a long period of time, calling for no inconsiderable amount of labor and painstaking care. Let this, therefore, be my excuse for communicating only a portion of the results obtained, which I shall take care to enlarge and detail at the earliest possible time. From my opening remarks and your own experience, you will know how important, practically, is any knowledge upon this subject. I have no hesitation, therefore, in laying before you this fragmentary communication.

The arsenious acid preparation which I have used exclusively is the well-known one composed of one part of arsenious acid and one part of sulphate of morphia, made into a paste with chemically pure carbolic acid, which was put into a drill-hole in the tooth and covered with a temporary stopping, such as cotton saturated with sandarac varnish, etc. I will not enter into details, but will only mention that, bearing in mind the results I wished to obtain, I drilled in the direction of the pulp-chamber, but did not in any case perforate it. It appeared to be quite immaterial, however, how thick

was the interposing dentine in respect to the changes caused by the poison.

I used human teeth and those of rabbits. They were extracted in from three to six days after the arsenious acid was applied. The teeth were opened immediately after extraction and immersed without delay in the proper reagent. It is very important to proceed in such manner that the pulp shall not be torn or dislodged, and yet may be acted upon by the fluids while still lodged in its natural position. When the elements of the pulp are once sufficiently fixed then only is it possible to cut (or tease) it without causing a great number of artificial changes. This is the first rule, I may say, which must be strictly adhered to by the student of so delicate an object as is the pulp. This is no easy matter, for unluckily the hardening fluids most generally in use themselves cause considerable changes; even water, and as has been found, the tissue-fluid itself, if allowed to act a sufficient time after death, gives to the medullated nerve-fibres an appearance which I have no doubt has frequently been described as pathological. Should I enter here upon the difficult task of describing the action of reagents, I would take up too much of your valuable time, and I am sure, furthermore, that I would tell many of you what you have known before. I will, therefore, say that after having used different other reagents, I have come to the conclusion that the very best results can be obtained by immersing the tooth in the manner described in a one per cent. solution of hyperosmic acid for from ten to twenty hours, according to the density of the tooth. As regards the pulp, this will be found to be sufficiently hardened after a sojourn of two to three hours in the same fluid; it can then be easily removed from the pulp-chamber without fear of serious harm. Both parts are then placed in distilled water and preserved in alcohol. I have, however, invariably examined the pulp, teasing it with great care, as soon as washed, after sufficient hardening in hyperosmic acid. The changes here are truly remarkable. Firstly, if the poison has acted sufficiently long, the whole of the pulp shows to the naked eye, as soon as exposed, all the signs of active inflammation.

I shall not enter into details of the appearance which such pulps present, but shall confine myself to a description of the alterations found in the medullated nerve-fibres. According to the degrees of inflammation resultant from the irritation which the arsenious acid undoubtedly does produce, a greater or less number of nerve-fibres are changed in appearance in such manner that their myelin is sepa-

rated into larger and smaller masses, between which I have not been able as yet to distinguish either an axis cylinder or an intermediate substance. I may, however, mention that I have seen in nerve-fibres which have remained under the influence of the arsenious acid for six days a granular substance which can be colored by rose aniline. When the poison has acted for the last-mentioned period all vestiges of myelin have disappeared and in their stead are found smaller and larger globules, which are stained a deep black by hyperosmic acid. I will not venture to advance an opinion as to the nature of these bodies. Thus much, I dare say, however: they are certainly a product of the disintegration of the myeline sheath. I have no doubt that this is a stage in the complete destruction of the nerve-fibres, and I may mention in this connection that, in one instance, I have found similar globules free in tissue surrounding a number of degenerated nerve-fibres in an incisor of a rabbit after three days' reaction of the arsenious acid.

You will no doubt agree with me that even this is far from complete, but you will at the same time be forcibly reminded of similar results found by many histologists after section of peripheral nerves in other parts of the body.

What will be the result of the arsenic so applied, not alone to the pulp itself, but as regards the nutrition and life of the whole tooth, is easily surmised, and can be demonstrated clearly by an examination of the dentine.

After having treated the newly extracted tooth with hyperosmic acid, and thereby guarded against artificial changes, I prepared ground specimens of the same. These were then stained with picro-carmine and suitably treated for mounting in Canada balsam. I purposely abstained from decalcifying these specimens, for, unless this process is watched with great care, the result in most cases will be, to say the least, very problematical. I have found that for the closer study of the dentinal canaliculi and their contents—the Tomes fibres—all decalcifying agents are out of place.

A superficial view of such specimens shows that hyperosmic acid has been reduced in certain places, whereas others appear colorless. Let me say at once that the former are regions of pathological changes. They start either directly from the place of contact with the arsenious acid, and extend varying distances into the dentine, according to the time of the reaction; or, as is evident where they can be traced as far as the pulp, they radiate apparently from the latter and extend toward the periphery. Viewed under the

microscope the dentinal canaliculi are very much enlarged, more so at one place than at another, and they appear to be filled with a mass deeply stained in black. The same can be said of the transverse connections of the canaliculi. When, however, high powers (one-tenth of an inch immersion of Grunow, N. Y.) are brought to bear on such places, the black mass is found to be composed of irregularly-shaped bodies, which I doubt not are remnants of the dentinal fibre. For, in following up such canaliculi, it can be distinctly seen that the greatly swollen dentine-fibres are broken up more and more as one approaches the seat of the greatest destruction. As a consequence, the basis-substance is very much narrowed in extent as the canaliculi gain in diameter. Moreover, it appears that the lime-salts are dissolved. I incline to this view because of the peculiarity of coloring, a matter into which I deem it advisable not to enter more fully just at present. I may add that, in such places, when the canaliculi are in transverse view, all these conclusions are fully borne out.

So far do I feel justified in entering upon this important subject to-day, although there are many points which I have thought best to lay over or only to touch upon. I am well aware, and should be prepared to hear, that the microscopical changes in the dentine are similar to those found in dental caries. It is well that in dental pathology, as well as in general pathology, due reference should always be made to the clinical aspect of the disease, and it is not less than presumption to classify together pathological units, with our present methods of investigation, enormous as has been the progress in this direction of late years. I am, therefore, far from identifying the changes here under consideration with those found in dental caries.

I am also aware that in very many cases, apparently, the effect of arsenious acid has not been so bad as might be expected, but on the other hand, you may all remember severe cases of local or even constitutional disturbances which could not be traced to any other cause than a dead tooth which had been treated with arsenious acid. Be this as it may, the question is certainly in order, whether, in view of the serious consequences, we are any longer justified in destroying pulps by the use of arsenious acid, and the answer must be that the risk is too great for the gain.

DISCUSSIONS.

Dr. Peirce: I have been much interested in the specimens of Dr. Bödecker and his explanation of them, but it seems to me that it is

unsafe to state that the arsenic has produced certain results when we are not sure what results would have taken place by devitalization from other causes. We are all aware that tissue does not remain quiet a moment. The instant there is devitalization changes take place, and therefore when we assert that these changes are due to the presence of arsenic we need, it seems to me, to know what would have been the appearance had devitalization occurred without the presence of arsenic.

Dr. Bödecker: I can only say that after three days' reaction of arsenious acid through a comparatively thick column of dentinal tissue, the inflammatory reaction which you have seen under the microscope was brought about. I do not think that any local irritation of the dentine could possibly have produced it; at least I have never seen it. I have seen hundreds of pulp-specimens which had been under the effects of irritation from caries, but in these cases I have never seen anything like this. The whole pulp-tissue is affected by the use of arsenious acid.

Dr. Horton: I would like to know what tooth that was, whether a molar, bicuspid, superior or inferior, and the age and sex of the patient?

Dr. Bödecker: This particular specimen, I believe, was from the mouth of a young lady about twelve or thirteen years of age, and the tooth was a first lower molar.

Dr. Watkins: I would like to ask Dr. Bödecker how much arsenic he puts into that pocket?

Dr. Bödecker: It does not make any difference how little of the arsenious acid is applied. I put in just as little as was possible, but always obtained the same reaction.

Dr. Watkins: How long would you leave it there before removing it?

Dr. Bödecker: I have stated this in my paper,—from three to six days.

Dr. Watkins: If you leave it in longer than three days there is great danger?

Dr. Bödecker: Of course, the longer the arsenious acid is left in contact with the tissues, the greater the danger.

Dr. Allport: I would like to ask Dr. Bödecker whether he regards this change in the pulp as due to the presence of arsenic transmitted through the tubuli to this tissue, or to a transmitted pathological condition from the dentinal fibres, consequent upon irritation of their extremities from the presence of arsenic at that point.

Dr. Bödecker: This I shall have to find out later on. As I said, I have not had very much time to experiment. To determine this requires a great many experiments.

Dr. Allport: The idea that arsenic will destroy a tooth-pulp by being placed in contact with the dentine is old. We know that thousands of pulps have been destroyed by applying arsenious acid in cavities of decay for the purpose of destroying the sensibility of the dentine. Because teeth so treated lost their vitality, the practice was long since abandoned by all intelligent practitioners.

Dr. Abbott: I have examined these specimens of Dr. Bödecker's, and from what I can see I should judge that the conditions produced were very much the same as those produced by any other irritating substance. In other words, if a tooth were decayed, and a section of it properly mounted, we would have the same result that we have seen under the microscope as produced by the arsenic. The fact of its working its way through so rapidly to the end of the pulp is simply due to the intensity of the irritation, causing the contents of the canaliculi to become swollen and broken up into the granular mass we see. Dr. Bödecker has explained that in many instances they have broken into spherical forms. This is the same condition that I described in 1879 as being found in deep-seated caries. The appearance under the microscope is the same. I think if the pulp were to die or was inflamed from any other cause, the same conditions would be observable that are here presented; *i. e.*, the conversion of the pulp and the contents of the canaliculi into an embryonal or elementary condition.

Dr. Taft: Dr. Bödecker refers in his paper to the enlargement of the dentinal fibrils. I would ask how this enlargement is accomplished. Is there a removal of the interstitial material or is it pressed aside? If there is a removal, a solution must first be effected; if that is the case, how is it accomplished? How is provision made for this enlargement of the material of the tubuli?

Dr. Bödecker: I stated in my paper that I recognized in the action of arsenious acid upon the Tomes fibres a similarity to the action of caries, but the changes produced by arsenic are very much more rapid. I do not want to be understood to say that the action of arsenious acid and that of caries are identical. I also stated that I cannot say any more about these changes at present. I intend to further investigate the action of arsenic so far as lies in my power to do. I furthermore stated that when these Tomes fibres swell and disintegrate the basis-substance of the dentine is absorbed.

Dr. TAFT: This is a very interesting subject for those who are in the habit of using this agent in the treatment of the teeth, or even in the destruction of pulps, but especially in the treatment of sensitive dentine. I have not for many years used this agent. There are several things that should be remembered by those who use it. One is the varying susceptibility in different persons to its influence. Teeth of different densities will of course be affected differently, so far as the time required to produce a given effect is concerned. There seems to be, in many instances, even where the teeth are apparently equally dense and about alike as to perfection of structure, quite a difference of susceptibility to the influence of arsenious acid.

In some cases, when this agent is applied to sensitive dentine, it acts upon or through a thin lamina or stratum of dentine only; in other instances it penetrates much deeper, and in some instances destroys the pulp in a short time, even when applied in a very shallow cavity of decay. The age of the patient should always be taken into account. Other things being equal, the older the patient the more resistance will the tooth give to this agent. Many years ago I applied it to the teeth of a young person and the pulps were destroyed within twenty-four hours. I remember a case, thirty years ago, in which I used arsenious acid in a small cavity in a central incisor of a girl about fourteen years of age. It was applied about three or four o'clock in the afternoon, and the next day at twelve o'clock that tooth was purple, and a very high degree of inflammation occurred in the parts around it. This was a very well-defined case, and one in which the action occurred very promptly; but I have seen others very similar to it, and have seen the teeth of persons twenty-five years of age destroyed within twenty-four hours after the application of arsenious acid for obtunding sensitive dentine in a small cavity of decay. I remember another case, years ago, in which I applied it in a very small cavity of a lateral incisor. Within a day or two the pulp of the tooth was dead and inflammation set up, an abscess was formed in spite of everything I then could do, and the tooth was wholly detached and came away from its socket. I remember another instance in which similar treatment of a tooth by a neighboring dentist resulted in the same way.

I refer to these cases simply because if we are to use this agent, exceeding care should be exercised in its application to the teeth of young persons, and in older persons as well, even in teeth of the better kinds.

Dr. BÖDECKER: Dr. Taft mentions that the action of arsenious

acid varies very much with the density of the teeth. In the human subject I have not been able to experiment, except upon children up to about twelve or thirteen years of age; but on the other hand I have experimented upon a very old rabbit. I took three of his incisor teeth, one upper and two lower ones, which I found to be as hard as any human tooth I have ever ground. They were just like steel, but the changes produced in the rabbit's teeth were just as distinct and of the same character as those found in the human teeth.

Dr. Buckingham: Some experiments that I have made have led me to believe that arsenic when taken in is absorbed and not changed. It acts by its presence,—not by devitalization of the tissue, but in some way that we do not understand, and a preparation of arsenic that has effected these results is still at liberty to act upon other tissue.

I was experimenting some years ago with arsenic, to see whether it would be absorbed, by placing it in one of the legs of a frog and allowing it to go through. I found arsenic in every part of the frog. I suppose it went there by circulation in some way, or by absorption. I then wanted to know whether it was combined with the tissue, whether there was any decomposition of the arsenic itself, and I took an egg and mixed a certain portion of arsenic with it and boiled it so as to coagulate the albumen and make it a solid mass. I then placed it in a funnel and poured water on it, passing it through probably a half dozen or a dozen times, and then I tested for the arsenic in the egg, and there was not the slightest trace of it, showing that the arsenic had acted by its presence upon the tissue, and had been washed out by this dialyzation, as we call it.

When we apply arsenic to the pulp of a tooth, a certain portion becomes dissolved, and that follows down through the tissue of the pulp, destroying it by its presence; it does not act as a caustic at all, because it has the quality of preserving tissue.

Dr. E. Parmly Brown: If these demonstrations that Dr. Bödecker has made will prove to us that we are doing wrong in using arsenic I desire to find it out. When gentlemen write articles in journals and tell us not to use arsenic, and they do not tell us why, I want to know the reason. If I know anything, I can convince everyone why I know it. Because a young, inexperienced surgeon has killed some poor fellow with the knife, is that any reason why knives should be abandoned in surgical operations? And because Dr. Taft or any other dentist, years ago, did not know how to use arsenic, is

that any reason why I should abandon arsenic? With two exceptions, I know of no instance in my practice where it has not relieved my patients from the most infernal torment. I know of no instance where a filling has failed because arsenic has been used, nor have I read or heard of anything that has led me to believe that arsenic used intelligently is anything but a mercy to humanity. If it is, I will be very thankful to find it out,—I do not care who tells me, or what investigation has led to it.

Dr. PARK: I have been very careful about the use of arsenic, and have never used it except for the purpose of devitalization; and I believe in every case where I have had difficulty in getting an effect, I have found calcification of the pulp to exist. I recall several cases where I did not succeed in devitalizing the pulp until I had surgically removed the calcification, but as soon as I got the remedy in contact with the pulp below I succeeded. In some cases the calcification was so nearly complete in the root that it was impossible to get the arsenic into contact with the pulp.

Dr. McKellops had a case of a tooth where, after a long time, he could not succeed in killing the pulp, and had to remove the tooth, when he found the calcification almost complete. I don't remember to have ever failed myself in a case of that kind.

Dr. RICHARDSON, of London: I take a very great interest in the subject that is before us this evening, and I feel that I can but add my humble testimony. Upon the other side of the water we use arsenic with very great freedom, but with very great caution, both in cases of sensitive dentine and for the destruction of pulps. Judging from the sentiments of an assemblage such as this, I think I may say that public opinion, both here and in England, is in favor of the use of arsenious acid. I have had the pleasure of being associated with men who have discarded its use entirely, though in their opinion they were isolated. On the other hand, I have known of men using other agents, and I shall be very much pleased to introduce to your notice a new mode of treatment of the pulp at the proper time, but it would be irrelevant in this discussion, which is upon the action of arsenious acid upon the different tissues of the tooth.

Dr. TAFT: If there is anything in the experiments which Dr. Bödecker has made and the changes which he has shown us take place in the dentine after the application of arsenious acid, we should be exceedingly cautious how this agent is used. Either the indiscriminate use of it is wrong, or Dr. Bödecker is much mistaken in the observations which he has made.

Dr. E. Parmly Brown: I have examined with a great deal of interest the specimens under the microscope. I did not hear the paper, but I am going to read it very carefully. But with reference to the change that has taken place, is there any proof that that change is not beneficial? Is there any proof that that discoloration which you see is not for the better? Is there any proof that that part of the tooth is not going to last better than it would if the change had not been brought about? When we get at these facts and demonstrations we will know something.

Dr. Horton: These experiments rarely ever go far enough. When the young physician gave a certain prescription to a blacksmith and found it was a perfect success he wrote out a diagnosis of the case and the remedies. He was very soon called to a tailor to whom he administered the same remedies, and they killed him. He went home and noted in his book that what would cure a blacksmith would kill a tailor. In order to ascertain for our own guidance what certain results are occasioned by and what combinations should be avoided in the treatment of our patients, we should know the temperament of the patient, the age, and the sex. Now, in all these experiments these important items that lead to our guidance are generally left out. We have given us here a certain result produced upon a certain tooth that might not occur in a hundred other cases that might be selected from a number of patients.

Dr. Atkinson: Dr. Bödecker has told us honestly that what he had to present was only the beginning of a series of observations that he hoped he should hereafter complete, so that we might be able to apply the lessons to be drawn from them in our future practice. The paper is very clear and explicit in bringing out this fact, and inasmuch as the author says it is but the commencement of a series of investigations, and he has the modesty to state that he has not arrived at any definite conclusion upon the whole subject, all this discussion has been immaterial to the question.

SECTION VII.

Physiology and Etiology.

Report by W. C. BARRETT, Chairman.

THE members of Section VII. note with pleasure the increased attention which etiology is receiving from the profession. Those matters which are nearest to our eyes look the largest to us, and we may, therefore, be excused if we urge yet further study in physiology and etiology as the most important subjects which can engage the attention of the dentist. Physiology is the study of the laws which govern function, and the sole end of medicine is the attempt to regulate disordered systemic action. Do we, then, overrate the significance of this section of our work, when we claim that it is the foundation upon which all departments of medicine rest? that a thorough knowledge of physiology is requisite to the proper practice of any branch of medical science? that, in truth, all the several departments of actual medicine, surgery, practice, obstetrics, ophthalmology, otology, dermatology, dentistry, etc., are but the continued study of normal or diseased function, and, therefore, only distinct branches of physiology?

We are too apt in our essays upon, or discussions of, practical subjects, to pre-suppose in our hearers an acquaintance with the laws which govern systemic action, when the truth is that comparatively few are competent to appreciate a technical paper, because of their ignorance of the advances in physiological knowledge. Nay, more. Our literature is full of articles by authors who propose methods and prescribe remedies that evince an almost total lack of knowledge of the basal principles upon which medicine rests. Membership in Section VII., and a thorough study of the principles which it is its duty to consider, would greatly benefit most of the members of this Association, while it could harm none of those who might be comprised in the small remainder.

Etiology is fitly linked with physiology in this Section. If any man expects to practice intelligently and successfully, it is necessary that he understand, not only what normal function is, but what is the point of aberration and degeneration into diseased action. He who does not know the source and origin of any abnormal action, can but prescribe empirically, if he prescribes at all. How can one make a diagnosis or prognosis if he does not comprehend the nature of the disease; and how can he become acquainted with its character until he shall have learned its origin? In that disordered condition called pyorrhea alveolaris, for instance, the profession has not settled upon any distinct, determinate practice, because there is a diversity of views concerning its origin, or rather an ignorance of its nature in the minds of the great majority of practitioners of dentistry. Of dental caries the most antagonistic views are held by men of eminence in the profession, and, as a consequence, we are at work empirically—on the cut and try principle. Some of our best known dentists fill teeth specifically; that is, they have one specific remedy for all dental caries. They use nothing but gold, or employ only amalgam; but for this exclusiveness they are not able to render a physiological reason. What one of those who pretend to practice eclectically can exactly prescribe the pathological condition in which he always uses gold in his operations, or can intelligently describe the precise state of function which demands gutta-percha, or a mercurial filling? We are all at sea upon this subject, because of our ignorance of the etiology of dental caries.

But during the past year or two, dentistry has undoubtedly made greater advances in this direction than for a whole generation previously. At the International Medical Congress, held in London, in 1881, the cause received a great impetus, and this has been followed up by the studies and observations of a number of devoted men, nearly all of whom we may be proud to claim as American dentists. Their researches have not led all of them to the same conclusion, but in the diversity of views presented we find the best indication of the comprehensiveness of the investigations. Progress has been made, and if we cannot claim that the end has been reached, we are very sure that we are much nearer to it.

Among the views which have been urged by American etiologists the principal ones are, the chemical theory, first propounded by Mr. Robertson, of Birmingham, England, and ably advocated by Dr. Watt and others in this country; the chemico-vital theory of John Tomes; the inflammation theory, first propounded by Fox, but

modified by Abbott and Bödecker, to accord with the bioplasson doctrine of Carl Heitzmann; the bacteria hypothesis, as advocated by Leber and Rottenstein, by Underwood and Milles, and by what may be denominated the Springfield school, in this country; and the electrical theory of Mr. Bridgman, of England, which has been adopted—in part at least—by what is known as the "new departure" school of etiologists in this country.

There is another American dentist who has made extensive and original, as well as truly scientific observations—Dr. W. D. Miller, of Berlin—whose writings have attracted wide attention both in Europe and in this country. He has not adopted the views of any of those mentioned, but by a long series of experiments in the laboratories of such men as Koch and DuBois-Raymond, he has arrived at the conclusion that dental caries is not due to any one cause, but is the result of a number of factors, all of which must be duly considered in the solution of the problem. His experiments are not yet concluded, and it is to be hoped that he will succeed in throwing yet more light upon this much-vexed subject.

SECTION I.

Artificial Dentistry, Chemistry, and Metallurgy.

Report by T. L. BUCKINGHAM, Chairman.

SECTION I. would, in the absence of any formal report, recommend that the following named gentlemen present their views orally on the subjects placed against their names respectively: T. L. Buckingham, chemistry; W. H. Trueman, Richmond crowns; C. S. Stockton, general remarks; N. W. Kingsley, appliance for improving speech; A. E. Matteson, his method of making crowns.

DISCUSSION.

Dr. Buckingham: We are unfortunately very far behind in the branch of chemistry. We have very little literature, and we know very little about the whole matter. Chemistry lies almost at the foundation of all sciences,—even back before physiology and pathology. Anyone who will take the trouble to examine any work that is published upon the subject of organic chemistry will find how exceedingly vague it is.

How do substances act? What are the changes that take place in structures? What is the reason that arsenic sometimes will act and sometimes will not act? What is the reason some other substance will not act as well as arsenic?

When you come to building up structure, how can you know the whole process of embryology, without knowing something about the chemical changes that take place? Tell us by what process the tooth is first formed. Tell us how it grows from the molecule. Tell us how those molecules combine together. Tell us, again, whether periosteum that has been destroyed can be reformed, and if there is a new periosteum tell us by what process it is built up. These are questions that we want to get at intimately, and that come under the subject of chemistry, and we should study them more thoroughly

than we have. In some inorganic structures we can tell some of the changes that take place, but very few. We know the results. We put nitric acid on silver and nitrate of silver is formed. How does the nitric acid hold the substances in solution? When we deposit that, by what force is it deposited?

These are questions that are difficult to understand,—so difficult that we are not likely to progress very far until we get to the very foundation of the principles underlying them.

Acid, for instance, destroys the tooth-tissue. How does it destroy the tooth-tissue? What changes take place in the acid and in the tooth-tissue? What is the difference in the form of the combination? If we will study properly we may reach a greater degree of knowledge than we have now attained.

These are some of the points that pertain to dentistry, in which the dentist ought to be much more fully instructed than he is at present.

Dr. W. H. Trueman: Within the last few years there has been shown a strong disposition on the part of mechanical dentistry to encroach upon the operative branch. This is probably an outgrowth of the increasing desire of the profession to preserve the usefulness of the natural teeth as long as possible. This is seen in the increased thought given to pivot-teeth; and still more, in the efforts made to dispense with partial plates, and replace them with appliances rigidly fixed to roots, or to the remaining teeth, or to both. It has indeed become a question where to place the dividing line between mechanical and operative dentistry, as these appliances, to be really successful, demand the best skill of both branches combined.

The advantages of a denture that is firmly fixed and leaves the mouth entirely free are very great. It is the nearest approach to the organs it replaces we can obtain; but there are also disadvantages associated with such appliances not to be overlooked. Unless great care is used in their construction, they will prove very temporary and a source of discomfort as long as they are retained. The difficulty of keeping them clean and free from the accumulation of food is a serious drawback to their usefulness. Where roots can be used and the fixture arranged without injury to any of the remaining teeth, there is no question that to make the attempt is good practice. But are we justified in destroying the pulp of a sound vital tooth? Are we justified in even cutting *into* a sound tooth to secure anchorage for such an appliance? Would it be good

practice, for instance, where a lateral was missing, to destroy the pulp of a perfectly sound adjoining canine, cut off the crown, and mount two teeth on its root; and, perhaps, also, cut a cavity in the central to give the fixture additional firmness, as I am told is being done,—I am pleased to add,—by dentists who advertise extensively, for I cannot conceive that a *real* dentist would ever commit so great an outrage?

We may often to advantage make one root support two or even three teeth where the conditions are favorable, as I have done several times; but when we make an appliance that is rigidly fixed to two or more roots or teeth, is not the risk of failure largely increased? We all know how uncertain a pulpless tooth is. Is it not a great risk to rigidly fasten several of them together with an apparatus that is not readily removed? What will be the probable result if any of them become inflamed, as they are so liable to do? And again, the advocates of bridge-work, as it is called, urge the attaching of eight or ten teeth, or even an entire denture, to four roots. What will be the probable effect on the four roots thus made to do the work of two or three times their number? It seems to be one of those things in which it will be well to advance slowly. It may be practicable. I saw two such arrangements in the same mouth, constructed in Paris about 1856. On each jaw were about ten teeth, mounted on a heavy half-round gold wire, and rigidly fixed to about four roots. The roots had been plugged with wood, and gold pivots soldered to the fixture driven into it. In each jaw were several natural teeth, but the denture had no connection with them. Nearly all the roots of the missing teeth were in; they had been filed down, and the wire rested upon them. I understood from the patient that she suffered very much for several weeks after they were inserted. When I first saw the case, it had been in place about twenty years, had never been removed, and had given entire satisfaction. It was lost some five years afterwards from recession of the gums loosening the roots. In that case, there is no doubt the patient had a far more comfortable and satisfactory denture than plates would have been; but, I must add, the odor from the roots and the accumulation of food the patient was unable to remove was very, *very* vile.

Bridge-work is not to be utterly discouraged; in skillful and discreet hands its capabilities are great, and so long as it is confined to roots or teeth of little value, it can be made to relieve the patient of the inconvenience of a plate,—at least for a time,—make a more

serviceable denture while it lasts, and if it does hasten the loss of the roots, it leaves the mouth in no worse condition for a plate than it found it. When we see how much has been done to make pivot-teeth more permanent and cleanly, who can say what persistent effort may not do in that direction in the future?

Dr. STOCKTON: I hope very much that the other Sections connected with this Association will be able to promulgate knowledge among the members of the profession and the world at large, so that very soon there will be no occasion for a Section on Artificial Dentistry. It is difficult now to discern just where the line between operative and mechanical dentistry should be drawn.

Take, for instance, such operations as Dr. Bonwill performs, which seem to be entirely in the province of operative dentistry, and, on the other hand, such operations as are performed by Dr. Matteson and Dr. Richmond and others, which seem to belong almost exclusively to the mechanical department. Hence it is a very difficult thing to decide what belongs to one department and what to the other.

There is one fact brought to notice by Dr. Trueman, which, it seems to me, should receive the condemnation of this intelligent body, and of all other enlightened dentists. It is this: I understand the practice to be, when the loss of one or more teeth has been sustained, to advocate that an adjoining tooth, sound and useful, shall be sacrificed—cut off—and upon its root the two or more teeth be placed, in order to avoid the use of a plate. A very intelligent gentleman made the remark, which seems to me almost justified, that anyone who would be guilty of such a practice as that deserved to be horse-whipped.

My attention has been called to a new mode of holding in the mouth an entire upper denture. It is to do away with the central suction cavity, and to secure it upon the alveolar ridge. I present the plate for your inspection. The inventor tells me he has tried it in a number of cases, and there is no difficulty except for a short time,—a day or two,—when he has an entire adaptation of the plate to the mouth. I am inclined to think very favorably of this. I remember the case of a prominent preacher who had to have a set of teeth made about every six months, and he said to me that he was afraid he would have to give up preaching. The plates got loose. I made him a plate without any suction cavity, and from that time to this I have never had to change it. I believe a perfect adaptation of the plate to the mouth is a great deal better than depending upon a little place in the centre to retain it.

Dr. Bödecker: About six or seven months ago, at a meeting of the New Jersey Central Dental Association, Dr. Timme, of Hoboken, exhibited a hydraulic press, invented by Dr. Robert Telschow, of Berlin. It appeared to me that this was an exceedingly good idea, and I determined that the first opportunity I had I would use this method. Dr. Timme has lately struck off two gold plates for me with the press. The particulars of this process are as follows:

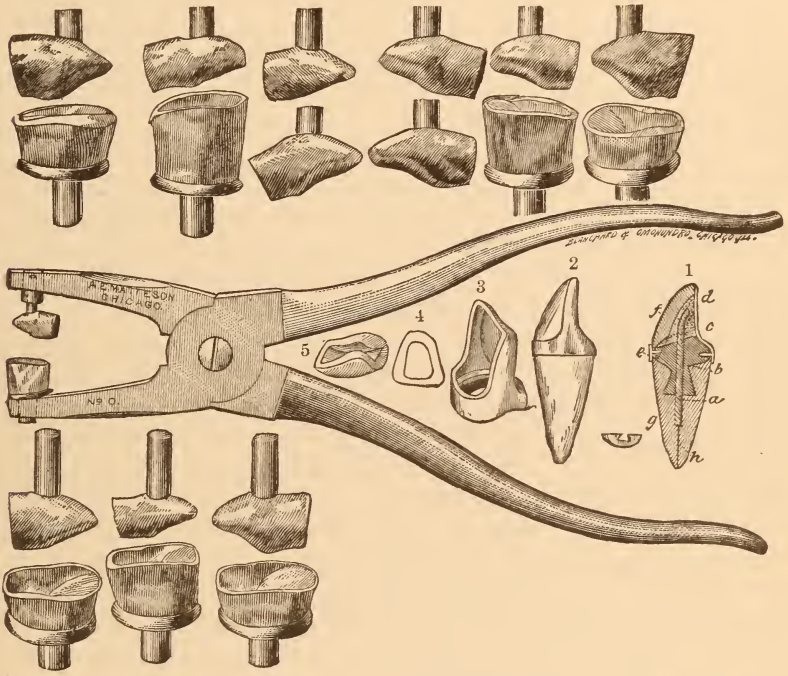
The plaster impression is taken, and into this a compound of sulphur and plumbago (Spence's metal) is poured, which melts very quickly, and very quickly hardens. This is removed from the plaster impression, and a gold plate is pressed over this with the fingers as well as it can be done; or, a zinc die is made, and over this the gold plate is roughly hammered, as the Spence metal will stand any amount of pressure but no hammering. The gold plate and a piece of rubber which holds it in its place are put into the hydraulic press. The press will force it home with greater accuracy than I have ever seen accomplished by any other process. The pressure is about eight hundred atmospheres to the square inch. I have seen a good many plates fitted in the mouth, but I have never seen any that fitted so perfectly as those made by the hydraulic press.

Dr. Priest: The method of pressing plates into form has been advocated before this Association at a previous meeting. I think a better way is to cut the plate near the centre of the anterior portion, allowing it to lap as it is bent into shape, first forming it in the palatal arch (after cutting), which will allow the metal to move laterally; and with a die made by pouring lead into the arch of the zinc die, making what is often called a frog, then placing tough paper or thin cloth at each side of the plate, it can be easily and quickly driven, and made to approximate the form of the palatal arch, when the remaining portion can be readily shaped over the alveolar ridge, the lap reduced to the proper width, the edges beveled, and, after it is quite well fitted, soldered. If done nicely, and with fine solder, it will be hardly thicker than the plate; and, if properly finished, will not melt or flow during any subsequent heating. I consider it necessary in forming all "suction" plates to make two sets of dies (and sometimes the third), to produce a perfectly formed plate.

Dr. Matteson: The improvement in the crown which I have to offer to the profession will necessitate a somewhat lengthy description, and as I have no notes here you will excuse me if I do not make it as clear as I would otherwise.

[Dr. Matteson intended to have had cuts to illustrate his remarks, but they did not arrive until too late. He has since furnished them, and his remarks are made to refer to them.—CHN. PUB. COM.]

The crown is formed with a shell (Fig. 3) which covers the lingual surface, extending around the sides and cutting edges and with a narrow band (*e* Fig. 1) embracing the circumference of the root in front at the gum, and into the opening thus left, is fitted a porcelain front (Fig. 5), presenting very much the appearance of the Richmond crown. The shell is made of gold and platinum plate,—gold on one side and platinum on the other,—of about No. 33, standard gauge.



The porcelain front is a plain plate- or rubber-tooth, with a dovetailed slot, which is cut with a corundum wheel and disk, running lengthwise of the tooth. The root is prepared to receive the crown by enlarging the canal two-thirds of its length, so as to receive a platinum wire screw, No. 16 to 18, wire gauge, the screw taking firm hold when inserted. The outer one-third of the pulp-canal is further enlarged with a cone-shaped bur with its base toward the apex, and the end of the root countersunk.

A platinum ring (Fig. 4) is fitted to the inner circumference of the shell, so that when in position the ring rests on the end of the root and about midway of the width of the band in front, in which position the ring is soldered. The porcelain front is then fitted into the opening in front, and the screw is inserted and cut the required length; the screw should extend about two-thirds of the length of the crown.

The root is filled around the screw, and the end of the root is covered with amalgam or cement, the crown adjusted, and the packing of the filling continued through the opening in the front, covering the ring in the shell,—if amalgam is used about one-half of the shell should be filled,—leaving sufficient room to insert the front.

Into the dovetailed slot and in the front and remaining portion of the shell is inserted sufficient cement to complete the filling, when the front is inserted, the excess escaping around the edges, which are burnished around the front.

The appliances for making these shells are in the form of dies and counter-dies, which are interchangeable in forceps made for this purpose. Each set comprises dies and counter-dies for the six superior front teeth, two lower cuspids, and one lower incisor. The inner surfaces of the lower incisors of the two sides are so nearly alike that but one die and counter-die are needed for both.

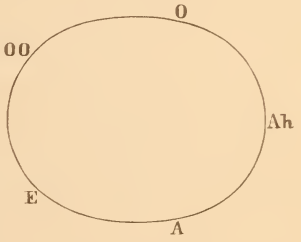
Dr. KINGSLEY: I observe among those present some gentlemen who have heard me speak fully upon my present subject—"Articulation and the Mechanism of Speech"—years since, and I have to ask their indulgence for some things I shall say which to them may appear ancient history. To such I would say that there is really nothing new in what I shall present, for the years that have passed have only served to prove by repeated demonstration that the opinions I then advanced were true.

I have devoted more than a quarter of a century to the study of the subject, have performed many experiments to improve the speech of those afflicted with cleft palate and have probably seen a larger number of such cases than any other person.

The physiological and philosophical origin of articulate speech lies in the vibration of the vocal chords, which creates vibrations or waves in the passing current of air, and such waves reaching the ears of the hearer produce the effect we call sound. Sound and voice may here be used as interchangeable terms. The sound produced by the vocal chords may be one in tone, note, and key, but in passing through and out of the mouth it becomes changed by the alterations in the form and size of the buccal cavity. The one note produced when

the mouth and the fauces are wide open is the vowel *Ah*, and all the other vowel-sounds which are heard in any language are but modifications of the sound *Ah*, made as above described.

In the English language we have five distinctly marked vowel-sounds, but the division of the one note, *Ah*, into the five vowels only, is more arbitrary than otherwise. We can illustrate the entire scope and compass of vowel-sounds by the accompanying drawing:



By sounding each one of these vowels as named separately and distinctly, beginning with *OO* and continuing with *O*, *Ah*, *A*, *E*, and then repeating the same order more rapidly until there becomes one continuous sound, it will be seen that the division into five sections or vowels is entirely arbitrary—a matter of convenience and a concession to unappreciative ears. If our ears were as finely attuned as those of some of the lower animals, this cycle of sound might have fifty divisions or vowels instead of five, but for the general purposes of spoken language distinctions in vowel-sounds should be strongly marked, and more than five are not likely to be appreciated. These five sounds, together with interruptions, make up in their almost infinite combinations the whole of spoken language.

The interruptions or stops we call consonants, and were it not for the liberal use of consonants any spoken language would be very limited in its scope and expression.

The effect of the consonant is very simply illustrated by sounding the vowel *Ah* and stopping the sound by shutting the lips; if the vowel is continued on opening the lips, *Ah* becomes *Bah*, and in a similar manner all consonant sounds are produced.

Cleft-palate patients are generally able to produce the vowel-sounds without difficulty, but many of the consonants are entirely wanting, and with such a fissure it is impossible to produce them. Some of the consonants depend solely upon the integrity of the normal palate, and others even are more or less affected by its rupture.

In many instances so large a number of consonant-sounds are imperfect that the speech becomes absolutely unintelligible. It is then that an artificial palate becomes a most beneficent provision. * * I am annoyed from time to time that real knowledge makes so little progress. More than twenty years ago I discovered that the surgical operation of bringing the sides of the fissured palate to-

gether, no matter how perfect the union might be, did not produce perfect speech, the reason being that the newly-formed velum is too short to reach the posterior wall of the pharynx, and by thus closing the passage to the nares enable the patient to make the defective consonant-sounds. There is a lack of tissue or material in the remnants of the palate when cleft to enable surgery to both bridge the fissure and get sufficient length for proper articulation. The surgical palate is too short *and always will be.* I have preached that doctrine over and over again, and when I could get the ear of a scientific man long enough to thoroughly understand what I meant by it, he was always convinced, so much so that in every instance where a surgeon had been sewing up cleft-palates he recognized the cause of failure and abandoned the operation. Not a distinguished surgeon in New York city will operate for cleft-palate, because he does not believe he is doing the patient any good.

I will repeat the statement, that unless there is absolute closure of the space between the soft palate and the posterior wall of the pharynx, distinct speech, as we have it, is impossible. I have resorted to mechanism to supply the defect; but with all that has been accomplished in remedying the difficulties in the way of perfect speech for this class, I am obliged to say that I have rarely seen a cleft-palate patient in whom there was not a slight peculiarity of *voice*, even after the best service that was in my power had been bestowed. This peculiarity is a peculiarity of *voice* and is the result of a different resonance, caused by the abnormal naso-pharyngeal cavity, and is likely to be always associated with a mechanical appliance. It does not always occur, but when absent is probably the result of accident rather than design. No one can with certainty overcome such abnormal resonance except by repeated experiments upon the same individual, and the experience gained from one case might not apply to another similar one.

This peculiarity of voice (which the speaker illustrated by speaking for a moment with one nostril closed) must not be confounded with indistinct articulation or enunciation. I have seen scores of patients wearing artificial palates whose distinctness of utterance was quite the equal of anyone in this room. In fact, there are many persons present taking public part in the proceedings whose articulation is more defective from a critical stand-point than that of many artificial palate patients.

The kind of apparatus best adapted to produce such results is not always the same, in shape, material, or principle. I believe, all

things considered, that the principle of most universal application, the one most likely to ensure the best results, is that of an elastic artificial velum, filling the cavity and under control of the muscles in the adjoining tissues. Such a velum more nearly resembles the natural palate in character, function, and action, than any other appliance which has yet been constructed. With it the buccal-vocal tube or the nasal-vocal tube may be changed in form and resonating power, as the velum comes to be under the control of the wearer, and only under such circumstances can the most perfect articulation be learned. Nevertheless, I have seen patients who have so overcome their defective articulation by wearing an elastic velum, that they could still articulate well when a non-elastic apparatus was substituted. I have therefore in many cases substituted an obturator of peculiar form and with excellent results. Such obturators or artificial palates are sometimes made of gold, sometimes of platinum, but generally of vulcanite. Their peculiarity consists in a hollow bulb which occupies the naso-pharyngeal cavity and adapted with great care to the contracted condition of the surrounding muscles.

With such an instrument the burden of articulation devolves upon the action and education of the constrictor pharyngeal muscles and requires more skill to articulate all the sounds of our language properly than is required with an elastic velum or with well-formed natural organs.

Dr. THOMAS: Does not the speech improve with the continued use of the apparatus?

Dr. KINGSLEY: There will be no improvement in the speech at first. By experience we learn to know when the apparatus for a given case is what is required to enable the patient to acquire correct articulation. If you purchase a Steinway piano, you have no guarantee from the maker that you can make music. The instrument may be as perfect as it is possible to make it, but you must *learn* to play upon it. So with the apparatus for the cleft-palate patient. It may be just what is required to enable the patient to articulate properly, but as to how long it will require for the patient to learn to use it I do not know. It depends largely upon the aptitude of the student. Some learn much more quickly than others.

But in all cases there is no pronounced improvement immediately; it is at first almost imperceptible, and may go on gradually for years. Some patients will speak exceedingly well in a few months, while

others may never overcome the bad habits formed with deficient natural organs.

The age is an important factor in the problem, as the younger one begins to break up bad habits of speech or attempts to acquire a new language the more hopeful the result.

Dr. WATKINS: I have a case in practice of a lady about fifty years of age, who has been an invalid for seventeen years. The molars and bicuspids of the upper jaw have been removed for a long time. The alveolar process is entirely absorbed, and the mouth almost flat and very small. I inserted an upper set on rubber, and to my great satisfaction I secured a beautiful suction; the teeth seemed to stay in place very well. The process being so much absorbed I made the teeth pretty long. When she went to eat, however, the teeth would wobble all over her mouth. She tried them for two or three months, but could not seem to improve upon them, so I told her I would make her another set, and so I did, and in this case I made the teeth short, as I thought perhaps the length of the teeth had something to do with her difficulty in using them. I have now obtained a suction that I cannot break by taking hold of the front teeth, yet when she attempts to eat the teeth wobble in her mouth as before, and the suction breaks the moment she tries to bite anything with her side teeth. I would like to have some gentleman tell me what to do in this case.

Dr. STOCKTON: I think if the doctor will make the teeth so that there will be about the thirty-second of an inch between the upper and the *natural* lower teeth, she will be all right. She strikes the natural lower teeth somewhere and tips the plate.

Dr. HARROUN: I think there might be another difficulty, owing to the yielding of the soft parts under the plate, and the plate not being fitted properly at the sides. If this is the case I would trim out the plaster model so as to equalize the pressure.

Dr. DICKERMAN: I think there might be still another difficulty. The leverage may not be on the line of the alveolar ridge.

Dr. HORTON: There may be another difficulty. I often find such trouble from there being soft places. There is a soft part under the plate somewhere, where it rests well enough when she is not eating.

Dr. CRAVENS: At the age of fifty years, the natural teeth have become smooth on their occlusive faces. If you put in teeth the forms of which represent the age of the patient, you will probably have no trouble. A person of fifty years cannot chew with artifi-

cial teeth that bear cusps. The grinding faces should be ground plain for the aged.

Dr. Morrison: I would like to make a few remarks in regard to artificial crowns. I want to enter a protest against the method of cutting the crowns of teeth so heroically. I think a great mistake is made by cutting the whole crown down to the margin of the process or the margin of the gum, and then adjusting the crowns so as to crowd upon the process.

I have noticed several appliances, made for cutting the roots of the anterior teeth, by which pivot-teeth are inserted upon correct tenoning principles. They cut a tenon on the root and adjust upon it a metallic cap, which is made by machinery to fit accurately. I have no respect for a tooth of that kind put on in that form. It has no regard for the festoon of the gum, and if you carry it to the gum on the labial surface it must be very much under the gum on the approximal surfaces. All of the root should be preserved and as much of the crown as possible. Then restore the remainder with a metallic crown or section of a crown, making strong and durable work, but never cut away a half or third of a natural crown to substitute a porcelain one.

Dr. E. Parmly Brown: One of the most objectionable things to me in the past in mechanical and operative dentistry has been the making of artificial crowns, and this branch of dentistry is the only one that I have neglected. I have been experimenting for nearly twenty years, and have at last succeeded in producing a crown that will accomplish all that could be desired. I can conceive of no root of a tooth, dead or alive, that is fit to remain in the human mouth that I cannot crown with my system.

The first set of appliances, on which I have received a patent, I will exhibit to you, and if there are any gentlemen here who have any objection to patents, I will immediately sit down.

(The doctor illustrated by the blackboard his method of applying the crown.)

Dr. Howe also illustrated his method on the blackboard and by means of his instruments devised for this particular work.

Dr. Barrett: I want to present an idea, not original, but of value in the setting of gold crowns. Copper is rolled down quite thin, and a band three-fourths of an inch wide wrapped about the root of the tooth and forced up under the gum. A ligature is passed around both, the copper band is burnished down, and the ligature drawn tight. This copper band will now fit just about as we want the gold

band to do. Plaster of Paris is then inserted in this, forced up against the end of the root, and permitted to set. Take it off and if you use Babbitt-metal a piece of paper wrapped about it will lengthen it out sufficiently, when the melted metal may be poured into it, and thus a perfect model of the end of the root will be secured. That part that is inserted in the copper is the exact reproduction of the root of the tooth. The model will perhaps need a little dressing down with a file, when the gold band may be fitted about it and soldered, thus avoiding the necessity for the annoying and painful trying on in the mouth. I believe this marked improvement was devised by Dr. H. A. Baker, of Boston.

SECTION II.

Dental Education.

Report by C. N. PEIRCE, Chairman *Pro tem.*

SECTION II., Dental Education, in the absence of its chairman, was organized by selecting C. N. Peirce as chairman and Dr. Thomas as secretary. It is greatly to be regretted that the chairman of so important a Section elected at the close of the session of 1882, should not be present with his report, and especially so as the work outlined at that time was of such a nature as to require time in its preparation. This Section, however, presents the following for your consideration:

In reviewing the educational field, we find subjects which have in previous years claimed the attention of this Association still unsettled; but advanced steps have been taken which awaken a new interest, and give great promise of a flattering and bountiful harvest. The most important of these is the formation of the national organization of the State boards of examiners. This body, called into existence within the last few months, has for its object the promotion of a high and uniform standard of dental education; this work it hopes to accomplish through the local State boards of examiners. Organized by the adoption of a constitution and the election of officers, it becomes an important factor in the promotion of dental science; especially as it already embraces in its membership representatives from nine State boards. Its efficiency in this work will, as stated above, be through the influence it may be able to exert upon the State societies and their boards of examiners.

That this American Dental Association may more fully realize and appreciate the efforts of this new ally we append a few of the resolutions which were considered and adopted at its late meeting:

Resolved, That this National Association of State Boards of Examiners enjoin its members not to accept the diploma from any college which does not require two full regular courses of lectures, or its equivalent, one full course and five years' practice, previous to granting such degree.

Resolved, That this association insists that boards now connected with this body shall not confer degrees or titles of any nature.

Resolved, That this association recommends to the State societies of all States where no law exists, the necessity of an immediate effort for such legislation.

Resolved, That this association furnish all State societies with a copy or copies of a well-digested law, so that uniformity in legislation, as far as practicable, may be attained.

Thus you see that the work already undertaken by this new organization is in a line with much of that which has in previous years claimed the attention of this Section.

The subjects of the most efficient means of obtaining a dental education and of the requirements which should be exacted from the student by the various educational institutions before granting a dental degree, are still eliciting much discussion and varied opinions. There are some members of the Section who maintain that, were a medical degree first required before the student commenced the studies pertaining especially and only to his specialty, great advantage would accrue by virtue of this enforced culture. Others maintain that the medical and dental studies can be pursued simultaneously, the student electing from the medical curriculum the studies which are common to both professions; while others again maintain that in an exclusively dental school an education is secured which contributes most to the needs of the dentist, and hence promotes more thoroughly the culture and advancement of the dental profession.

The views expressed by members of the Section regarding the course or extent of study to be required previous to graduation are not less varied than those on the means of obtaining the education: some contending that two full courses, with previous training under a preceptor, before examination and graduation, is the only legitimate method to secure the highest degree of proficiency, while others maintain that five years' previous practice is quite equivalent to the first year of college instruction; and two members of the Section have expressed the opinion that faculties are quite justified in giving the student an examination whenever he may request it, without reference to the time of study pursued in their institution, they believing that their duty to the public and the profession was fully accomplished by this means of obtaining a knowledge of the ac-

quirements or proficiency of the applicant. It was the opinion of a large majority of the Section that this latter method was liable to many abuses and fraught with much danger to the best interests of the profession.

The sentiment of the Section was best expressed by the passage of the following resolution, which they recommend for your consideration and adoption:

Resolved, That the interests of the profession and advanced dental education both demand that all dental educational institutions shall require that every student, before being admitted to examination for the degree of doctor (or master) of dental surgery, shall have taken two full courses of lectures or its equivalent.

DISCUSSION.

Dr. HAYHURST: We are about entering upon a new era in this matter of dental education. We have been laboring for years past in the dark. We have not had those facilities for acquiring the proper education which ought to be the foundation of every profession in our land.

A few days ago at this place, in the formation of a National Association of Boards of Examiners was inaugurated a movement which must tend largely to the elevation of the standard of education, and to render the profession more honorable and efficient and desirable to enter into.

The discussion in reference to the effect of arsenious acid, and the possibility that the same effect may be produced by other agents, seems to suggest that it is not safe to adopt a settled theory upon any subject until we go to the root of the matter and inquire fully into the causes. We see agents at work, and yet we know not what they are. And we can only examine them as we study the effect they exert on matter upon which they operate.

The subject of dental education is so broad that we should strive to unite our best thoughts, and to lay a proper and sure foundation which will be of benefit to ourselves and to those who propose to enter our ranks.

Dr. CROUSE moved the adoption of the resolution as presented by the Section.

Dr. ATKINSON: I have an objection to the resolution on account of its ambiguity. What is that "other equivalent?" Any greenhorn can pass a body that is willing to confer an M.D.S. The impudence of a State enacting a law that shall make a new degree

when there had already been degrees established before! The M.D. and the D.D.S. are fully recognized in that little bit of equivalent. Besides that it simply names the degree that ought not to be regarded as a degree at all. In my former conversations upon this subject and in my efforts to get at the best methods of education, I have advocated either giving the student a certificate of the degree of advancement that he actually had made, or else make one degree to cover the whole ground and not to have a multiplicity of degrees; and if this body is a representative body of the consensus of the dentists of the United States, I think we ought to be careful how we adopt resolutions that will be ambiguous in their interpretation, and open the door to just such corruption as that which we are trying to strike against now.

Dr. PEIRCE: I would move to strike out the last three words, "or its equivalent."

Dr. BUCKINGHAM: I would like to ask what you understand by institutions. Do you understand colleges and institutions of that kind, or do you include these boards of examiners all over the country?

Dr. CUSHING: It says educational institutions. A board of examiners is not an educational institution.

Dr. ALLPORT: What institution confers the degree of M.D.S.

Dr. CUSHING: None but the State Board of Censors of New York.

Dr. ALLPORT: I move to strike out all in regard to Master of Dental Surgery. It certainly will be ambiguous in that way.

Dr. HAYHURST: I presume that sentence alludes to an effort made by the State society of the State of New Jersey, who went before the legislature last fall and endeavored to have the power conferred upon the examining board to confer the degree of Master of Dental Surgery. There was a great strife. Prominent men belonging to the profession in the State of New Jersey appeared before the legislature, both for and against the proposed action, and they had a very warm time of it,—so warm that some assistance was called for from a neighboring State in order to defeat the movement. Finally it was defeated, but I believe it is intended to make a future application.

Dr. BARRETT: Perhaps, to prevent misapprehension and to have a more clear understanding of this question, it will not be out of place for me to give a little explanation concerning the degree of Master of Dental Surgery, as existing in the State of New York. That provision of the law was the child of old Dr. Amos Westcott,

of Syracuse. It was not intended to be used as an evidence of any scholastic training whatever. The board of examiners require certain educational qualifications, but they demand more than that. They insist that the man who makes application shall present such testimonials as will satisfy the members of the board that he is in reputable practice,—not simply that he is qualified for a degree. I think since the institution of that degree the sentiment among many dentists in the State of New York has materially changed. That the degree has done us good, I firmly believe, but I am not sure but that if to-day a vote could be taken of all the members of the dental associations of the State of New York, it would be opposed to the granting of any such diploma.

Dr. STOCKTON: I am glad the resolution has been introduced, for it will strengthen our hands in the fight in New Jersey. We have been accustomed to follow the great lights of New York, and have been glad to do so, when they have been right, but though they be bright and shining, we cannot do so when they are wrong. Their baneful light has penetrated into New Jersey, and the dentists there applied to the legislature last winter for a law giving authority to the board of examiners, composed of five members, from two- to three-fifths of whom are not degree men, to confer the degree of M.D.S.

I was told it was a copy of the New York law, but I find that not quite the fact. The New York law has some restrictions; the proposed law in New Jersey none. But even with the New York restrictions it is bad—altogether bad. D.D.S. means, or should mean, a dentist, and is the only degree that should be recognized. You see the M.D.S. and D.D.S., and then again you see the D.M.D. and D.D.S., and you think the possessor of such a string of letters to his name is some great wonderful being, but after all he is only a common dentist, just like the rest of us. No, let us have one degree, and but one. Your examining boards may confer a certificate, if need be, but not a diploma. A man in this late day of dental colleges, in this day of education, who has not a degree, is either too ignorant or too lazy to possess it. It may have been all right for New York ten or fifteen years ago, but now the brethren there should place themselves squarely in harmony with the sentiment of the dental profession. I hope no State examining board will ever confer a degree. I would much prefer to see the stand taken that the D.D.S. will only be conferred upon those who are already M.D.'s than to see this back-track taken. I sincerely hope the resolution will pass.

Dr. PEIRCE: If the members of the Association observed the read-

ing of the report, they would recognize the fact that I had endeavored to represent the different views expressed by members of the Section. That resolution was drawn up, first, to get the unanimous sanction of the Section. It was also framed so as to bring out just the expression that we have had here. I want the Association to recognize that we have institutions and organized bodies which are conferring degrees upon examination alone; and I am glad that this imperfect report has brought out the expression we have had. The resolution has now been sifted and amended so that it reads intelligibly, and I trust that the Association will adopt it as it now stands.

Dr. Marcklein: We have in Wisconsin, organized under the laws of the State, two institutions represented to be educational,—one a dental and the other a medical institution. Any person, no matter how poorly qualified, can obtain a diploma for the large sum of twelve dollars in cash, conferring all that any diploma confers upon anybody.

The Wisconsin State Dental Society have for the last two years made strenuous efforts to have the institution known as the Delavan Dental College exterminated, but we find it is a legal institution. It is impossible to exterminate it unless the law is repealed.

I should like to have in this report one word added, so that it will read, "reputable educational institutions."

Dr. Allport: I can see no use in the amendment just offered by the gentleman. I think public sentiment is sufficient to correct the abuse referred to. I believe all our State boards have provided against any State board diploma being made useful in any other State than where issued. So far as the Delavan institution is concerned it is too palpably a fraud to have any influence with a board of examiners or an association of this kind, and our time would be wasted to notice it. These are matters that belong to the legislatures of the individual States and not to this Association at all.

Dr. Crouse: The State boards of examiners have taken one great step in not recognizing anything but reputable colleges. I hope by another year the national organization of the boards of examiners will be powerful enough to exert such influence as will compel all the colleges to give at least two full courses of lectures, and not allow five or even ten years' practice as an equivalent for one course. This Association has been trying for the last ten or twelve years to accomplish that purpose, but the boards will probably have more power to bring it about than we have. I am in hope that the colleges in time will be so regulated that it will not be necessary to have State boards. All the labor unions have a much better educational or-

ganization than we have. The plumber's apprentice cannot work as a journeyman for four years. A man can go through any dental college in this country in much less time.

Dr. Buckingham: Would it not be better to pass a resolution that no professor in a dental college should be on a State board? As professors they advocate two years' study, and as members of the State boards they do not require any time.

Dr. Rehwinkel: Our friend Buckingham seems to be very much agitated about the State boards; there is an impression on his mind that the State boards and colleges are entirely incompatible. He forgets as professor of a dental college that when he confers a degree upon the students, he not only certifies to their ability and qualifications for the practice of dentistry, but he confers a distinct honor upon them, which gives an entrance to the profession wherever they may be. Is that the case with a simple certificate of qualification given by the State board? It is not. The State boards simply certify to the qualifications of those to whom they grant certificates, so that they may practice dentistry legally under the laws of the State. It is not the business nor is it the right of the State board to inquire where their education has been obtained. It makes not a particle of difference whether it is obtained in a college or whether it is acquired elsewhere. The sole business of the State board is to ascertain whether persons who come before them can be allowed to go at large and practice dentistry in a harmless way without doing great injury through ignorance. We cannot prevent their doing harm from malice, but the law wants to guard the public so that they shall not be imposed upon by the practitioner of dentistry through ignorance merely. They cannot inquire into the moral character of men.

When you examine a candidate in your college, before you give a diploma, you not only ascertain,—if you do your duty,—whether he is qualified, but you also inform yourselves whether he is an upright, honest, trustworthy young man. We are approaching nearer to the time when we can do away with boards of examiners, when anyone who desires to come into the dental profession will come through but one door, and that is through a regular college education.

Dr. Peirce: The dentists in the State of Pennsylvania for some years tried to have a law enacted for the protection of the public, and finally, when it was sent to a committee of the legislature, they stated in a conference with the dentists that it would be burdensome to the young men in the State who have been practicing, or who wanted to practice, if it forced them to go to our colleges.

As a compromise we said that we would have a State board of examiners, and that the State board should have the power to examine applicants, and if found qualified to practice they would be granted certificates allowing them to pursue their industry without reference to whether the education was obtained at college or elsewhere. The law has been an advantage. Every year brings us nearer to the time when the State boards can be abolished, because the student will seek the schools. The people are becoming educated, and are feeling that there is an advantage to be gained by patronizing the dental practitioner who has taken his full course of instruction over those who are simply self-taught. Since we have had our law and State board of examiners, four of the gentlemen who have taken certificates from the board have gone to college and taken the degree, and they have since appreciated the advantages of such a course. Since 1875 we have had forty-six candidates for examination, fifteen of whom received the certificate, and the rest were refused on account of disqualification. Several of those who were disqualified have since attended schools and become proficient. In this way the law has operated advantageously.

Dr. Allport: If our State boards of dental examiners do their duty, as I believe they are disposed to do, they will really become the regulators of our entire system of dental education. To illustrate: in the State of Illinois our State board of health determines who shall be allowed to practice medicine within our State by determining the diplomas of what colleges shall be accepted as evidence of qualification for practice without an examination by the board. If our dental boards will unite in this matter and judiciously determine the diplomas of what dental colleges shall be accepted as evidence of qualification to practice dental surgery, and judiciously examine all who do not hold such diplomas before allowing them to practice in the several States, the great work of dental education will be very much promoted. This is why I say our State boards should be commended, and that they are hereafter to become the regulators of dental education.

Dr. Hayhurst: I think there is an important distinction always to be made between the certificate granted by the State boards of examiners and the diploma of the college. The certificate is not a diploma in any sense of the word. Having been a member of the State board of New Jersey since 1873, and being conversant with the nature of the examination, I consider the boards an instrumentality that tends to nourish the dental colleges.

SECTION III.

Dental Literature and Nomenclature.

Nomenclature of the Art and Science of Dentistry.

Report by J. TAFT, Chairman.

LANGUAGE is the vehicle of thought from one person to another. This communication is perfect and efficient in proportion as there is precision and definiteness in the language used, and a correct and uniform understanding of its meaning. Language should be definite and used upon such a basis as will give it the greatest range of usefulness and most enduring stability. A word is an utterance of the human voice which expresses a thought, or names a thing or action. The imperfect use of words occasions confusion of thought and ideas and impairs the value of language. Perhaps there never was a greater tendency to mutilate, adulterate, and dilute a language, than now exists in respect to the English. For this there are several reasons. It has largely incorporated with it, and indeed is mainly made up of material from many other languages. The large admixture of different nationalities in this country is a prolific source of vitiation of pure English. People of other nationalities abound with us; their efforts to use our language result, as a rule, in a mixed speech quite at variance with pure English. Their errors and incongruities are too often imitated by those who should avoid them. Education has become popular, and a large proportion of the American people desire to appear at least to be educated and cultured. The reality is, however, often much below the assumption: hence the misuse and abuse of language greatly abounds. Many are in the habit of using words and phrases, of the true meaning and power of which they have little or no conception, even in the grosser sense. The would-be scientist is often guilty of the most absurd use of names, terms, and phrases. The press pours forth a ceaseless current of literature, incalculable

in amount, the preparation of which is too often in the hands of those unfitted for the work. The free indulgence in slang words, phrases, and provincialisms, tends greatly to the corruption of language. Loose and careless habits in the use of language weaken its power and lessen its efficiency.

"The Anglo-Saxon, with its immediate descendant, the modern English, is said to have the strength of iron with the beauty of burnished steel. It is the mother-tongue of the English language. About three-fourths of the words in common use are from this source. Not only in the number of words but in their peculiar character and importance, as well as their influence on grammatical forms, Anglo-Saxon constitutes its principal strength; and at the same time its chief peculiarities of structure and idiom are essentially Anglo-Saxon. From the same copious fountain have sprung words designating the greater part of the objects of sense and the terms which most frequently occur in discourse, and which recall the most vivid conceptions, as sun, moon, earth, fire, day, night, etc.; and words expressive of the dearest relations, the strongest and most powerful feelings of nature from our earliest days, as mother, father, sister, brother, wife, home, etc. The language of business, of the shop, of the market, and of every-day life, our national proverbs, our language of humor, satire, and colloquial pleasantry, the most energetic words we can employ, whether of kindness or invective; in short, words expressive of our strongest emotions and actions, in all the most startling scenes of life from the cradle to the grave, are derived from the Anglo-Saxon. Every speaker or writer, then, who would not only convince the understanding but reach the affections, should adopt Anglo-Saxon expressions, which, from early use and dearest associations, excite emotions and affect the heart."

Every department of human occupation has its peculiar names, words, and phrases. In some they are far more numerous and prominent than in others. This is true in a remarkable degree in the professions, for instance, law, theology, and medicine; distinctive names and phrases more abound in the last than in the former two. There seems to be a necessity for this, growing out of the multiplicity of parts and their relations to each other and their reciprocal influence.

In medical literature a large proportion of the special names are taken, changed but little, if any, from other languages, and chiefly from the Greek and Latin. The propriety of anglicizing these names is a question about which there is some diversity of

opinion. The rendering more plain and understandable these names and phrases would seem to be very desirable, inasmuch as a large majority of those who engage in the study of the branches in which they so greatly abound have but little or no knowledge of any other language than English. Oftentimes the student will struggle with names and phrases without a knowledge of their meaning for months and even years. Nothing that can be as well designated by the pure English word or phrase should be named by words of another language, because a large proportion of those who study the professions are not familiar with those languages, and especially the Greek and Latin. Usually the names from these languages used in descriptive anatomy and pathology are not more expressive nor better in any sense than well-chosen English names and phrases. A large share of the labor in mastering these branches consists in becoming familiar with the nomenclature.

The growth of language is slow, and change cannot be rapidly introduced. In the use of language for conveying thought, that which is best adapted should be employed, using only those words and terms that will most clearly and fully designate the thought, object, or action. Many names are used upon analogy or association that will hardly stand the test of close criticism. To some of these reference will be made as we proceed. It is said that in the development of art and science new words and phrases are a necessity, but in introducing these caution should be exercised. Every new word, name, or phrase introduced should be made clear and comprehensible to every reader before it is generally employed. Its origin and significance should be such as to commend it to the judgment of every one of general culture.

In the art and science of the dental profession there are many *distinctive* names and phrases. For the most part, perhaps, these are well chosen, and as expressive as is possible in the present state of our language. There are, however, quite a number of nominations of very questionable propriety. To a few of these we now propose to call attenion.

The different teeth have different names,—some of these sufficiently distinctive, as for example, the incisors, the molars, the bicuspids, the cuspids, etc. To some of them, however, names are frequently given which are of doubtful propriety. For example, the cuspid teeth, both superior and inferior, are often called *canine* teeth: this simply because they approximate the form of the dog's tooth. This is certainly a very faulty basis for a distinctive name,

inasmuch as many other animals have teeth of a very similar form, —indeed, quite as pointed as those of the dog. The word cuspid means a point, and when applied to a tooth means a pointed tooth. No other word can better designate this tooth. These teeth are also sometimes called "eye-teeth," as applied to the superior, and "stomach-teeth," as applied to the inferior. These appellations are wholly unwarranted by the forms of the teeth, or by any relation they have to the parts referred to in these names.

The FIRST PERMANENT molar is often called the "sixth-year" molar and sometimes the "six-year-old" molar, the latter being a crude expression that no one of just taste would tolerate for a moment. The ground of this nomination is the fact that this tooth is usually erupted when its possessor is about six years of age. The inappropriateness of this name is apparent from the fact that the tooth may appear at any time from five and a half to seven years of age, and in some instances even later.

The name as used would seem to indicate the age of the tooth rather than that of the possessor. There is no more propriety in thus designating these teeth than in calling the second molar the "twelfth-year" molar, or the third molar the "eighteenth-year" molar, or in naming the bicuspids according to the years of their eruption. The appellation "first permanent molar" is clear and distinct, and cannot apply to any other tooth; let this, then, be the name by which this tooth shall be designated. The third molar is known by several names. Some think it entitled to the Latin name, and hence call it "dens-sapientiæ," and others are content with the same name in English, and call it the "wisdom-tooth." The better and more distinctive name, however, is the third molar; this is clear and understandable by all, and is quite sufficient for its designation. The multiplicity of names always tends to confusion.

That part of the teeth resting in the alveolus and by which the attachment is made is denominated the "root" and the "fang." The latter name was in far more common use some years ago than now; one of these names is quite sufficient to designate this part of the tooth, and the word "root" is certainly more appropriate than the word "fang." None could be mistaken by this application of this word, while "fang" is more appropriately applied to the sharp-pointed body that protrudes from a socket or base. Nothing is gained in any respect by the use of these two words to designate that part of the tooth by which it is attached to the jaw. Let the word "root" then be adopted for this designation to the exclusion of the word "fang."

Having heard the anterior root of a lower molar defined as the mesial root, and not being able to appreciate the sense of such a definition, it is proposed here to bring before the Association the terms "mesial" and "distal," in order to get a true definition and the proper use of these terms.

Mesial, Greek *mesos*, middle; anatomical definition ("Medical Lexicons"), an imaginary plane dividing the head, neck, and trunk into similar halves, towards right or left; every aspect towards this plane is mesial, and every aspect towards right or left is lateral, every lateral aspect being either dextral or sinistral. In the human subject the teeth are arranged around the margins of the jaws in a parabolic curve, or approximating it, and on this account special names have been applied to various surfaces with reference to front, back, or sides, in order to indicate the position occupied by the teeth and their relation to definite terms universally made use of by anatomists, to wit., median anterior and posterior. It is therefore correct to designate the approximating surfaces of the central incisors as the mesial surfaces, because the position occupied by them fulfills the concept we have, that if the median line passes between them the surface looking towards this line is the mesial surface, the labial surface representing the anterior, and the lingual the posterior surface of a central incisor. But, as before stated, the maxillary arch forms a parabolic curve; hence, it stands to reason that when this term is applied to a bicuspid the position of surfaces changes entirely—that is, if the same nomenclature is employed, the surface that was properly designated mesial in the incisors becomes an anterior surface in the bicuspid, in either the upper or lower maxillary, and what was denominated anterior and posterior in relation to the median line must now either be defined as labial and lingual; or, if you will,—carrying out the meaning of the word mesial,—designate the lingual surface as the mesial; for it is the one surface that looks towards the median line.

Dentine.—The word dentine has been long in common use, to designate that part of the tooth constituting its body, which is found beneath the enamel and the cement. Perhaps no better term than this can be found. The word "dentos" has been suggested as a substitute for the word dentine, but why the change should be made we do not readily see. The word dentos may be appropriately used as a name for the bony covering of the dentine of the root of the tooth. This material is usually denominated the cement or cementum; both meaning the same thing, cementum

being the Latin form of the word, cement the English. This outer portion of the root of the tooth partakes much more nearly of the structural character of bone than of dentine, and may with propriety be denominated dentos. This word would be far better restricted in its application to this part of the tooth. Dr. Chase, of St. Louis, some years ago suggested the use of this name. However he may have intended, it has been used by many as designating the hard structures of the teeth and by some the dentine merely. This word is an illustration of certain cases in which it seems better to use the word of another language. The cases in which this is necessary are few and the number should be lessened whenever practicable.

Tooth-pulp.—The soft, highly-organized body occupying the central portion of every tooth is frequently called the "nerve" of the tooth. Many of our best writers, from custom or habit rather than from a proper application of this name, have used it. It has perhaps received this nomination because of its extreme sensitiveness when exposed to external contact; but the inappropriateness of the term is apparent when we remember that only a very small part of this body constitutes the actual nerve-tissue. It is made up of a small portion of membranous and fibrous tissue, of a large amount of fluid or semi-fluid, veins and arteries, together with a small amount of nerve-tissue. There is no more propriety in denominating this body a nerve than in so designating any other highly sensitive and finely organized tissue or part of the body. The eye as a whole, for instance, may be as properly designated a nerve. The word nerve as applied to this tissue is to the student at least misleading. This structure has sometimes, very inappropriately, been called the lining membrane of the tooth, and hence some writers in former years spoke of destroying or removing the lining membrane, evidently meaning the pulp of the tooth. The word "pulp" or "tooth-pulp" is sufficiently distinctive and understandable and could not be mistaken for anything else, and would convey more nearly the idea of the structural character of the tissue. It has been suggested that the use of this name might also indicate that pulp-mass from which the tooth grows. This is readily distinguishable, however, by the word "embryo." Is it not proper and desirable therefore to designate this soft tissue as the "pulp" rather than the "nerve?"

Periosteum.—This is the usual name given to that thin layer of soft tissue immediately surrounding the root of every tooth. Some have been disposed to use the word "periodontium." For such a change we really perceive no valid reason; this tissue of course sur-

rounds the dentine, but is not in contact with it, the cement or dentos intervening, which in structure is more nearly allied to bone than the dentine, and it is in actual contact with the former and not with the latter. If the desire is to be very definite and indicate that this structure is about the teeth rather than some other bone let the qualifying word "dental" be adopted. The phrase "dental periosteum" is as easily spoken and really more distinctive and more euphonious than the word periodontium. When we spoke of an inflamed condition of this tissue in conformity with this we would say periostitis instead of periodontitis.

Mechanical Dentistry.—This phrase has long been used to designate that part of dental science and art which has to do with the manufacture and insertion of artificial teeth and all that pertains to it. So far as the needs of mechanical skill are concerned this name may be sufficiently distinctive, but it is not sufficiently extended in its reach. Some may execute well in a mechanical aspect, and yet signally fail in the production and application of substitutes for lost teeth and the restoration of adjacent parts. The name that will embrace both these ideas, namely, that of mechanism and of art, that shall enable the *application* of it to the parts here indicated, is that which should be employed, and in a search of some extent, no better term occurs for this name than "dental prosthesis." Some have been disposed to change the form of the phrase to "prosthetic dentistry." The other is a better phrase, we think. This nomination is slowly but surely making its way in the literature of our profession. It will probably be used ere long to the exclusion of the phrase "mechanical dentistry."

Operative Dentistry.—This name or phrase is usually employed and properly so to designate operations upon the natural teeth for their preservation, or rescuing them from the ravages of disease. It embraces operations upon and treatment of the natural teeth, and is sufficiently clear and distinctive. There has been a little disposition in some quarters to drop this name and embrace everything done in the mouth upon both the hard and soft tissues in the name of "oral surgery." This may with great propriety be applied to all operations upon the soft and hard parts in and immediately about the mouth, but the nature of the operations upon the teeth is so different from those performed upon the other parts of the mouth as to justly entitle them to a distinctive name. There is sometimes an effort made to have a name embrace too much, and this would seem to be a case of that kind.

The Section in fulfillment of the task assigned it have deemed it proper to present these few illustrations of changes which may be appropriately made in the special nomination of our profession. These are only a few to which reference may properly be made, but time would hardly permit a more extended presentation of the subject, and we fully recognize that change of language is necessarily slow. It would be a waste of time to even suggest any very great or radical change, with the hope that it would receive even brief consideration; but where there are manifest defects in our language, and especially in its nominations, which must be apparent to persons of general culture, and where names tend to confusion rather than to a clear understanding, it behooves us to do what we may to remedy such defects. The great difficulty that lies in the way of changes such as are here suggested is found, not so much in the question as to whether they are correct or not, as in the carelessness and want of attention by those who should be interested to make progress and secure the best form of distinctive literature.

SECTION III.—Continued.

Nomenclature.

Paper by W. H. ATKINSON, of the Section.

IN past efforts to fulfill the duty incumbent on members of this Section, it has appeared that the ambiguity of the name of the Section gave rise to misapprehension of what that duty is; in other words, it has been taken for granted that there was a "dental literature" and a "dental nomenclature" sufficiently defined to be made the subject of well-digested discussion and elucidation.

Dental literature is not good nomination for the *literature* pertaining to *teeth*. Dental nomenclature is open to a like objection. Like literature in general our text-book and journal literature is not always a truthful presentment of the degree of advancement in the knowledge considered. If I apprehend the object of forming Sections in the American Dental Association, it was to so divide the work as to get at textual statement of knowledge already attained; and to get at better methods of investigation of the underlying principles out of which to evolve matters as yet unknown.

To have science we must have the means of so arranging the parts of knowledge as to make a complete whole. Such orderly arrangement will consist of concise statements of facts. To have these *taught* they must be *repeated*. They may be repeated by word of mouth or in technicalities of written or printed statement. These last are the elements of the *literature* of the subject, in which *nomenclature* plays an important part. Both oral and written or printed texts have their use and advantage and disadvantage—that is to say, oral instructions are fresh and flexible, while written and printed texts are rigid and always the same, which is an advantage in case they are well formed and correct. But as each text can only record already attained apprehensions of the subject-matter, we are shut off from new aspects of suggestion and demonstration that are

open to those who teach under the stimulus of present surroundings and new discoveries. The literature of our specialty is in the same dilemma as that of other fields of research and execution—that is, the text-book and journal writing is in the main the product of beginners, in the enthusiasm of fresh attainments, and full of adventitious and irrelevant, not to say unripe, conclusions. The juveniles and conservative memorizers of exploded texts by far exceed in number and quantity in their contributions to text and journal literature those who give us really instructive and reliable articles.

Correct literature involves correct nomenclature, and this to be correct must adequately describe the objects which are the subjects of observation. These subjects consist of things and concepts of things and their behavior or activities; and as all the activities that come within the range of observation depend upon an illuminating impact from beyond the range of sense, it is clear that our knowledge of these is an ever-advancing series of perceptions of things and their functions, as revealed through their perceptible movements as individuals and as masses, whereby we are able to classify them and record them in the text, by the use of which we hope to save those who come after us the expenditure of some of the time, patience, and effort it has cost us to attain them.

In science, as in religion, he who attains a step in advance becomes desirous that his fellows be made to partake of that which he so highly appreciates. We may carry the analogy throughout æsthetic attainment in that portion of it where there is no commercial advantage to result from the promulgation of the new revelation. In the nature of things, that which is called science must have a career from small beginnings to higher and broader realms. Even that boastedly *exact* science called mathematics had to pass this ordeal in finding apprehension and statement by human brains, mouths, and pens, so as to pass into the printed text, for purposes of teaching inquirers the way in which they could best come to correct apprehension and rectification of the knowledge that finds genesis and expression in astronomy, cosmogony, geology, geography, natural history, anatomy, physiology, and psychology. All the foregoing are involved in and explained by the sciences of mechanics and chemistry. So that in all our investigations in acquiring and proving the facts and formulæ of literature and nomenclature, we are using excerpts of the values of the exhaustive researches of the past workers in these fields, which are held in the mind by a condensation or begrip of the whole, which spontaneously spring into demonstration when

the attention is sufficiently concentrated to afford the requisite receptivity for the revelation of truth!

A degree of mental and affectional clarity and intensity is ever the precursor of revelation to the consciousness, so that formulæ may be recorded and successfully taught. A like clarity and intensity, in kind if not in degree, are necessary to an understanding of the recorded text. So we may say, without inspiration we are utterally unable to indite, write, or comprehend the formulæ of any science or process whatsoever. When the affections are all on the *qui vive*, and the brain in high tension, demonstrations are clear, comprehensible, and satisfactory to otherwise dull listeners, even when expressed by indifferent formulæ; while the best formulæ will be rejected by the cold-blooded intellectualist, who discards *sentiment* as misleading in all matters of scientific investigation.

Sentiment is in reality the condensed essence of logic, or an unconscious holding of the values of the experiences of ancestry upon which instinct and reason are predicated. If instinct (sentiment) never misleads when free from the domination of boastful reason, may we not aver that reason is a safe guide only when not discarding or leaving out any ray of sentiment.

The science of literature (belles-lettres) involves a knowledge of all methods of record of human experiences from the earliest and simplest to the latest and most complicated and involved methods.

The simplest method is pantomime or mimicry and addresses the sense of sight only. The next is trophic or hieroglyphic and also addresses only the eye.

The third form of communicating the observations and experiences of men adds to the previous two methods that of the phonetic, which addresses the ear or the sense of hearing.

Appearances are represented in a crude way by mimicry and symbol, and sounds are produced by the voice. In the effort to recall the communications by voice, representatives or symbols of sound were invented or discovered, and these are called letters.

Letters represent single or compound sounds, and therefore stand for words and parts of words, in syllables or letters that together form the syllables of complex words, composing sentences in speech.

Repetitions, amplifications, specializations, and combinations of pantomime, picture, and speech have evolved all the languages known in literature, general and special.

In efforts heretofore made to convince this body of the inadequacy, multiplicity, incongruity, and inanity of the groupings of

effete methods of teaching, the principles and their outcrop in the laws governing functioning bodies that have stood in the way of the attainment of knowledge of the working of minds and bodies in health and disease, little appreciation has been manifest—let it be said, not on account of the perversity of those composing this noble fraternity, but by reason of a bad lead, initiated and maintained by a bad text and effete literature that has dominated all efforts to attain and to practice prophylactic and redemptive procedure in living bodies that were laboring under aberrant functional activity.

If, then, our dental literature is a diseased weakling, by reason of the dim perceptions of facts and incompetent nomenclature to record even these, shall we longer succumb to a blundering external authority of past intellections, by following the leadership of the blind, or shall we not rather assert our own right and ability to insist upon comprehending both the facts and the philosophy of which our literature is to consist; and not rest satisfied until each one can not only understand the diagnosis and proper treatment of his subjects himself, but demonstrate to others that he is in possession of the knowledge and dexterity necessary to make him successful in his professional undertakings?

To do this he must get away from the mere vaporings of dimly perceived propositions in physiology, pathology, and therapeutics, and recognize the manifoldness of the process and the complexity involved in any statement of fact or philosophy in the understanding, and record in literary perspicacity by a well-selected terminology the ever-advancing revelations in dental literature.

Dental literature is like the individual body in its advent; *i. e.*, it has an infancy, youth, maturity, and decline. No one standard of periodicity will fit all the examples we meet with in life experiences, so as definitely to fix certain ages in years as adequate limits of infancy, youth, manhood, and decline.

Some infants display the character of youth, and some youths are mature in characteristics, thus putting us at fault in our classifications in every-day life. So in like manner, some youths contribute ripe articles to our literature, while many men of mature age give us only puerile articles. To have the best literature we must have the ripest editors to select and publish it. Literary pabulum, like that for the growth and sustentation of the body, must be varied to call out the digestive power. Unvarying liturgies fail to hold the attention of the populace; so also mere repetition of old formulæ ceases to

engage the attention to the requisite degree to secure vigorous growth and research.

Dental literature, to be useful to the world, must so instruct readers as to enable them to comprehend and apply the doctrines and methods recorded in its pages. The absolutism of text-book and journal literature takes it for granted that the positions taken are impregnable and final; while everything pertaining to functional activity is in a mist so dense as to ignore the only study that can reveal the molecular metamorphosis upon which it depends. The questions put forward for settlement are such as to reveal the utter lack of perception of the points at issue—namely, "Germs or Acids —Which?" is the caption of a paper upon the "etiology of decay," thus making concomitants pose as antithets, etc., etc.

Writers and editors of our literature are divisible into two classes, each holding that it includes the other, and *vice versa*, viz., those who depend upon the mass-appearances, and those who assert that microscopic, infinitesimal bodies are the only seats of functional operations, the aggregation or massing of which are seen in the behavior of the organs, as factors of the functions of nutrition, locomotion, and intellection.

The advocates of the macroscopic side of this question grandiloquently claim to be exclusively "scientific," and point to the results of vivisections and drugging as demonstrations of their claims. The advocates of the microscopic side of the question are not content to say brain action is intellection, glands operate the secretions, and muscles the locomotion and other movements we see in the body. They say intellection is the act of a nerve-corpuscle, secretion occurs in the body of an epithelial corpuscle, and motion in the disk of the muscle. In the estimation of the macroscopist the brain, gland, and muscle are the *sine qua non* to physiology. In that of the microscopist nerve-corpuscle, epithelial body, and muscle-disk are the true workers in physiology.

And now the histologist comes in and says, "Gentlemen, you are both right from the points of view taken. But let us see if there is not a deeper insight of the subject possible to be had. Those who have studied the Protista, Protophyta, and Protozoa most sedulously acknowledge that these all arise in an amorphous solution of proteinaceous elements without visible germs. The amœba performs the acts of intellection without visible nerve-corpuscle, locomotion without muscle, and secretion and excretion without epithelia."

If, then, these infinitesimal bodies present us with all the actions of

human bodies, are we not justified in looking beyond the visible bodies for the power that is manifest in physiological movements?

Now, gentlemen, as histology owes its provable existence to visual amplification by the use of lenses, may we not indulge the hope of a like revelation in the occult region of molecular metamorphosis, whereby the production, maintenance, and replacement of tissues and elements of tissues may be demonstrated.

The current literature of physiology, pathology, and therapeutics is ambiguous, not to say dishonest. The muscles are said to move, the brain to think, and the glands to secrete; the heart to circulate the blood, the stomach to digest, etc., etc. Food, poison, and medicine are said to act on the organism. Would it not be better to say that the various functions which together constitute physiology are operated *in* the various parts where they appear, rather than *by* the *organs* in which the elaboration of function in nutrient, poisonous, or remedial manifestation takes place? When this mode of expression is urged in discussions, the reply is, "Well, everybody knows that is what is meant." It is just this sort of quasi meaning that is the point of interest and contention.

Hoping that these suggestions may find acceptance, justification by elaborate minutiæ will not be attempted now.

DISCUSSION.

Dr. Crouse: It occurred to me that the gentleman who read the first paper hardly comprehended the province of the Section on Literature. That is to say, a report like this should not be limited to defining words and criticising the language used in our dental literature. It seems to me that the Section should present to this body a synopsis of all new works pertaining to our specialty, so that we can get an idea of the value of such books without going through so much trash as we should many times have to do, instead of dwelling on the number of journals and how many dentists take journals and how many do not. In that portion of his report I think he is in error. There are not over ten thousand dentists practicing in the United States,—from the best information we can get,—and out of the ten thousand more than one-half take at least one journal. I think one of the greatest barriers in the way of dental education is that we have too many journals for the amount of *reliable* material furnished to them. Every institution, every dental depot, every col-

lege that wants to advertise, publishes a journal, and if we do not take them they will be forced on us, and thus we have a great deal of worthless and positively injurious matter reprinted. If we could have the matter worth reading condensed into one good journal, I confess that I should read with a great deal more interest than I do. It is no wonder that dental practitioners skim over and read but little of their journals. There is a great deal in the journals which it would be better for the student not to read. The trouble I have had with young men has been to get them not to believe very much that they see in the journals. I hope that next year this Section will give us a proper report upon the literature of the profession.

Dr. ABBOTT: I am very fond of having things "boiled down." The number of dentists practicing in the United States as given by some of our dental depots, who have an interest in collecting such names, is between ten and eleven thousand. We have a depot in New York which has sent out the announcement of our college to twelve thousand seven hundred practicing dentists in America. The *Dental Cosmos* is furnished to four thousand five hundred men in America. We have eighteen other journals in this country which are taken by a great many men who do not take the *Dental Cosmos*, so I should judge that one-half the men who are practicing dentistry in this country are taking journals. I believe the demand for literature in our specialty is growing, and that the journals will do better even than they have done.

Dr. MOORE: I think the journals are doing a good work, and that their influence and circulation are extending every year. I would like Dr. Crouse to suggest some method by which the journals could be made to publish nothing but what we ought to read.

Dr. CROUSE: I was trying to get the Section to do that.

SECTION IV.

Operative Dentistry.

Report by E. T. DARBY, Chairman.

THE Section begs leave to report that up to the present time no papers have been presented for its consideration, but the Section is strongly of the opinion that there are several subjects worthy of the consideration of this Association, and it would therefore suggest that the following subjects be discussed under the head of Section IV.:

1st. "Treatment of Children's Teeth and the best Material or Materials with which to fill Young or Uncalcified Teeth."

2d. "The Use of Textile Metals, and the Combination of Tin and Gold; also, the Combination of Gold and Amalgam in the same Cavity."

3d. "Irregularities of the Teeth, and the Methods employed for Correction,"—the discussion upon this subject to be opened by Dr. Keely.

DISCUSSION.

Dr. Taft: There is considerable diversity of opinion and practice with reference to the management of the temporary teeth. I regard this as a very important subject. I know that in the minds of the people there is a great want of appreciation of the value of these teeth, and of the importance of their care, and I apprehend that in the minds of the dental profession there is a want of appreciation as well, and hence many of this class of teeth are permitted to become badly diseased. They ought to be preserved in a state of health during the time they remain in the mouth, and whatever can be done to secure this end should not be omitted. We often see the teeth of children who have been under the care of dentists grossly neglected, and in a condition of uncleanliness that teeth ought never to show. Temporary teeth are often so decayed and diseased as

to prevent their proper use in mastication, causing great inconvenience and embarrassment; but that is not the most serious consequence to be feared. The influence of such conditions upon the germs of the permanent teeth almost certainly results in imperfectly formed or developed teeth. Parents and guardians should fully realize that they ought to be cared for, kept thoroughly clean, be well used in mastication, and upon such food as will keep them properly exercised. When they become decayed it is important that they should be promptly looked after, so that incipient decay may be removed, or cavities already formed be filled before such operations would be too late. In the filling of these teeth a temporary material may be used. Hill's stopping, gutta-percha, or oxyphosphate of zinc, etc., etc., will serve the purpose. Every one knows that it is a very serious matter to attempt a prolonged and difficult operation upon the temporary teeth of young children, and so the necessity of the case seems to require that something that can be readily applied in a very brief time shall be employed. Happily for the patient these things are at hand.

Dr. Horton: In the treatment of the temporary teeth much trouble arises from the fact that the people are not properly instructed regarding the necessity of their care and preservation. They are of the opinion that these teeth are of short duration, and that they can be removed without detriment if they cause annoyance or irritation, as they will be replaced by the permanent set in a very short time.

Within the last two or three years a physician in whose family I have practiced for a long time sent to me his little boy, about six years old, with the pulps of the first inferior temporary molars exposed, with the order to have them extracted. The first inferior permanent molars were decayed at the time they were erupted, and before the boy was six years old the crowns had almost entirely disappeared and abscesses had formed at the root of each. This created such an irritation that it was necessary to extract them; so when the boy came to me with the pulps of the temporary teeth exposed, I sent for his father and demonstrated to him that the boy would have nothing to masticate his food with for five or six years, if those two teeth were extracted as he desired. He told me to do as I thought best. I put the rubber dam upon those two teeth and very carefully cleaned them as well as I could without puncturing the exposed pulps. I then prepared some oxyphosphate of zinc about as thick as cream and dropped on each of the live pulps. Letting that harden

I mixed some more a little thicker and let that harden also, and then with great care completed the fillings with amalgam. That was done three years ago last summer. A few weeks ago I saw the case, and I am certain that those pulps were alive and well, and the circulation as complete as before they were exposed.

That is the treatment I give,—in a modified form,—to temporary teeth in such cases. These teeth should never be extracted as long as there is vitality, because the absorption of the roots of the temporary teeth is a vital process. Whenever a tooth becomes devitalized from any cause this vital action ceases.

A few months since I extracted six roots of temporary teeth that were in a very good state of preservation from around the upper bicuspids of a young lady twenty-six years old. You all know those roots should have been removed at ten or twelve years of age, by nature's operations. They remained at least fourteen years beyond the time they were of any use, simply because there was no attention paid to the condition of the mouth by the patient, or the dentist, if she had one.

There are but few cases in which I would remove temporary teeth. One is where there is trouble that is causing the death of the pulp, and great irritation or inflammation follows. Another is where the permanent teeth are erupted and there is no possibility of the absorption of the roots.

Dr. Watkins: I have a case of a young lady, nineteen years of age, who has not lost the second temporary molars, which seem to be firm in the jaw. They are not decayed, and there seems to be no sign of the bicuspids coming. I would like to ask Dr. Horton what he would do in that case?

Dr. Horton: If there is no evidence of the permanent tooth coming, leave the temporary tooth there. Perhaps the germ of the permanent tooth is wanting. I recollect one family that have no upper bicuspids at all, and their temporary teeth are to-day in the mouth, and some of the family have reached mature age.

Dr. Watkins: Do you not think that nature has already supplied the germs of the permanent teeth, and that the irritation caused by the removal of the temporary ones would stimulate nature to do its duty, and that the appearance of the missing teeth would soon follow.

Dr. Horton: If there is no evidence of it I would let the temporary tooth remain.

Dr. Rhein: I differ somewhat from the doctor in regard to this

matter. I had a case very much like the one to which Dr. Watkins has referred. A gentleman, aged about twenty-three, came to me a few months ago complaining very much of a swelling in the neighborhood of what would be the first permanent molar on the right side. The parts around the tooth were very much swollen. He told me he had had trouble of the same nature about this time every year for the three years last past, and he had gone to different dentists on each occasion and they had given him relief. It was impossible to make a thorough examination because of the inflammation. I treated the mouth to reduce the inflammation and told him to return the following day, and when he appeared, with a burnisher introduced around the tooth, I found it was his temporary second molar which was causing the trouble. I extracted the tooth at once, and found the roots entirely absorbed and the second bicuspid immediately underneath the gum. I have not seen the patient since, but I feel almost positive that the bicuspid will not come into proper position, from the view I obtained of it. I have seen a number of cases in which the second bicuspid has been erupted in a very irregular position—that is to say, the buccal surface of the tooth has been turned around to the approximal side, in one way or another. This is generally due to the fact that the second temporary molar has been allowed to remain too long in the mouth. The second temporary molar seems, in some manner, even after the roots have been thoroughly absorbed, to be held in place in the jaw very firmly. In the case I have described nature had for the last four years attempted to throw off this tooth but did not succeed, because the crown, the roots being absorbed, was wedged in between the first bicuspid and first molar. The same patient has a very irregular condition of his teeth generally. He has always been under dental treatment, and his four temporary canines,—merely because the dentist did not believe in extracting the temporary teeth,—were allowed to remain, and the consequence is that with the possession of eight canines and the lack of a number of posterior teeth, a worse condition of affairs could hardly exist than is to be found in his mouth.

I have in my mind a patient in whose mouth the second temporary molar was allowed to remain until she was about eighteen, and in consequence the second bicuspid made its appearance with the buccal surface turned toward the posterior approximal side of the first. I think a great deal of harm is done by allowing the temporary teeth to remain in the mouth too long.

Dr. Watkins: There has been nothing said with regard to the

treatment of children's teeth where the pulps are dead or the teeth abscessed. In the treatment of such teeth I find a preparation of iodoform an excellent thing. I use a prescription which Dr. Bödecker copied from the German and gave to the New York Odontological Society about a year ago. I apply this preparation in the pulp-chamber after removing all decay, and then fill the tooth with some one of the soft fillings, and I have yet to see the first case where any inflammation has followed after the tooth has been filled. I have been using this preparation about a year, and while, previous to that time, by pursuing the methods recommended by many dentists, in many cases I failed, since I have been using this preparation I have not had a single failure. I have also used the same preparation in covering the pulps of temporary teeth where they have been exposed, filling directly over the remedy at the same sitting, and in such cases I have not had a single failure. I find there are a great many dentists who have not used it and I would recommend it to them.

Speaking of children's teeth, I have under my care a child (?) about forty-five years of age, weighing about two hundred pounds, and she has not got her wisdom-teeth. She has a perfect set of teeth otherwise, in number twenty-eight, and there is no sign of the wisdom-teeth and never has been. She has never had any of her permanent teeth extracted. She is troubled with a great deal of neuralgia, and I would like to ask if it is possible that the wisdom-teeth are giving her this trouble, and if removing the second permanent molars would give the wisdom-teeth a chance to erupt and cure that trouble, or if it is too late in life for that.

Dr. Stockton: Not long since a lady of about sixty years of age presented herself at my office for consultation, and gave me the following history of her case: A short time before she discovered in the roof of her mouth something that did not belong there. She called the attention of her physician to it, who examined it very carefully and said: "You have a case of necrosis; your jaw is very much diseased, and you will have to have an operation performed." An eminent physician from the City of New York was also consulted, and he pronounced it as the local medical man had done a case of necrosis, and they decided to perform an operation. The patient was very nervous and would not consent at that time, and another appointment was made; but the old lady could not make up her mind to submit to the operation and sent the doctors home.

She asked me to look at her mouth. I did so, and told her that

the necrosis could be cured in half a minute. I extracted a cuspid tooth that had been lying dormant for years, but had recently erupted in consequence of the pressure, I presume, from a rubber plate that she had been wearing. Her necrosis was cured, and she naturally was greatly delighted and went home rejoicing.

Another case I would like to report. A very prominent gentleman in our city had a pulpless wisdom-tooth, which had remained in his mouth in that condition twelve or fifteen years. It finally gave him trouble, and I removed it. The inflammation did not subside, ulceration ensued, and during my treatment the family became very nervous and sent for the family physician, who insisted upon the patient applying warm poultices. The patient was a very large, fleshy gentleman, and his throat was almost closed by the inflammation. In order to quiet the nerves of the family I sent for my friend, Dr. Atkinson. I did not tell him what I had done, knowing that he knew what was right always.

Very much to my rejoicing and to the great satisfaction of the patient and the family he confirmed my treatment, and said, "Don't you apply anything warm, but use ice," as I had advised. If the treatment which the physician advised had been continued, I have no doubt from the temperament and organization of the patient that he would not be alive to-day. The case resulted all right, and the gentleman is well and has gone to Europe.

Dr. Buckingham: I do not see that we are getting very much information in regard to the treatment of children's teeth. We should consider not so much the extraordinary cases that present themselves and sometimes require extraordinary treatment, but those that generally and constantly require our care. If the temporary teeth are badly decayed, what shall we do?

Shall we destroy the pulps and fill the teeth, or shall we extract them? If we extract, what harm will be done? Will extraction cause the permanent teeth to be irregular? That is a question that has not yet been decided, and one of very considerable importance. Again, if we conclude to treat the teeth and fill them, what is the best treatment we can give? Shall we destroy the pulp with arsenious acid, or shall we use some other medicine that will effect the same result? We must bear in mind that the whole structure of the temporary teeth is much less dense than the structure of the permanent teeth, and for that reason we have to use a more gentle means to produce the effect.

I have no doubt that iodoform will answer in very many cases.

The composition of that is the same as chloroform, with the addition of iodine in the preparation. I have no doubt that you could get the same effect if you would use the tincture of iodine in combination with chloroform. The iodoform answers the purpose better from being already combined and easily broken up by the action of fluids.

Again, some preparations of zinc are probably best to put in the bottom of cavities when the cavities are large. We have no solid that is more congenial to an irritated surface than oxide of zinc. Mixed with creasote it will form a more perfect covering over a wounded pulp than any other substance you can get.

Dr. S. G. Perry: I take great delight in the care of children's teeth. I commence very early and urge upon parents the need of great care and constant watchfulness. I do not think I ever filled a temporary tooth with gold in my life. I use tin-foil, oxyphosphate, gutta-percha, and sometimes amalgam. To the permanent teeth, from the time of their eruption, I give the closest attention. I never allow a fissure that shows the slightest sign of softening to go unfilled. Many of those in the grinding surfaces I cut out and fill before the teeth have fairly erupted, because I recognize that the most dangerous period is the first few months after the teeth have broken through the gum. At this time they are often covered by portions of the gum, which cause a sheltered condition conducive to rapid decay in the imperfectly calcified fissures. With soft teeth and a destructive condition of the fluids of the mouth, I often lift the flaps of gum and fill the fissures under them with such materials as I can best use. I rarely use gold, preferring tin or oxyphosphate for such operations.

Every fissure into which I can pass my finest examining point I cut out with delicate instruments or the very finest burs. Under certain conditions I follow the fissures to their extremities, even if they have not already softened, for if this is not done I know that in a few years a second operation will be needed.

Before ten years of age I fill many cavities in the grinding surfaces of permanent teeth with the oxyphosphate of zinc, covering it at once with sandarac varnish. In the grinding surface fissures it sometimes lasts astonishingly. If the teeth are not sufficiently erupted to articulate with the opposing teeth, these fissures can be filled very full, thus allowing for wear. Cavities filled with tin or oxyphosphate at twelve years of age can be kept small, and, the borders being allowed to calcify, smaller fillings can be made at

twenty years of age than if the same cavities had been filled with gold at twelve. At this age the teeth are so soft that they must be cut away considerably to get sufficiently firm borders to receive gold, whereas we all know that the softened part of a cavity need not be all cut out in order to save the tooth with oxyphosphate or with tin, and we also know that in time the softened borders of the cavity become calcified—sometimes, in fact, even recalcified when decay had actually commenced. Therefore I watch the fissures very closely in young teeth, and endeavor to keep the fillings in them as small as possible. Before ten years of age I use tin or oxyphosphate quite largely. I can do this with safety, because most of my little patients are sent frequently for regular attention.

Whenever I find teeth of good quality and a manageable child, so that I can easily make a permanent operation, I use gold without regard to age. In the front teeth I use oxyphosphate and gutta-percha a great deal before even fifteen years of age. Before that age I sometimes use tin in the front teeth, though I prefer to put it in cavities exposed to attrition, for I have observed that in sheltered places it does not keep bright, but becomes oxidized and softened.

Dr. Crouse: I have nothing particularly new to offer except to indorse largely what Dr. Perry has said as to the filling of the first permanent teeth of children. I cut out the fissures and fill them with some preparation that will protect them for three or four years, or until they can be filled permanently. If the child is one whose teeth I can fill thoroughly without taxing it too much, and the tooth is well organized, I should fill it with gold.

Many times temporary teeth hold in their cavities agents that will destroy the permanent teeth in close and constant contact with them, and in such cases I should cut the temporary teeth away sufficiently to prevent their injuring the permanent teeth. They are particularly the source of injury to the first permanent molar and the lateral incisor. I should cut away the temporary cuspid freely, so that it could be easily kept clean, as a preventive treatment. I find a great many fissures in the teeth where a slight drilling and a small filling will stop the progress of decay and prevent what would later be a large cavity. This I call preventive treatment.

The most important thing is to get our patients to take care of their teeth. There are a great many parents who will take care of their children's teeth if you give them proper instructions, and who will train the children so that by the time they are ten or twelve years of age they will do that part of their duty thoroughly. This

instruction of parents is what I am particular about in my practice. I think we can do more good in that way than in any other.

Dr. Peirce: I want to call attention to a method of preserving the teeth upon which I have the credit of being a little deranged. We are all aware that American people usually at their meals drink freely of milk, tea, coffee, or water. It is very customary for children during meal-time to drink one, two or three glasses of milk, or water, or tea, or coffee with their more solid food, and in this way they take the food into the stomach without proper mastication.

I have under my care three families of children, and through the interest manifested by their parents they have been instructed to refrain from drinking except before and after meals, so that the food is taken into the mouth and masticated in a comparatively dry condition. I am satisfied that since these families have adopted this method the teeth have improved from their additional use in the mastication of dry food. They have also been improved from the better condition of the stomach and nutrition. I am also satisfied that an important factor in the decay of teeth is the lack of proper use and the want of proper nourishment. Both of these are largely facilitated by the absence of fluids during the period of mastication.

Dr. Harlan: I wish to call your attention to a new method of bleaching teeth, and first will say that I think no escharotic, or acid, or alcohol, or anything of that nature should be introduced into the cavity before bleaching. The rubber dam having been applied the root-canal should be filled from the apex down about one-third of its length. All decay should be removed, but it is not necessary that all discolored dentine should be. The cavity should then be washed with water, or, as I prefer, with peroxide of hydrogen, and well dried, when it is ready for bleaching.

The agent I now use for this purpose is chloride of alumina, the formula of which is $Al_2Cl_6,12H_2O$. It is a yellowish-looking, granular, crystalline substance. It is placed in the cavity dry, and a drop or two of water added, when it it is immediately deliquesced and the discoloration is readily attacked and destroyed by the chlorine which is immediately liberated. If the discoloration should depend upon the micrococcus prodigiosus, which produces the reddish tinge, it is destroyed at once. One thing should be kept in mind, and that is, that hydrochloric acid is formed within the cavity, which should be neutralized with bicarbonate of soda or some other preparation of that kind, and then the interior of the tooth may be filled with any of the oxychlorides.

You should never permit moisture of the mouth to get into the cavity after the oxychloride has been introduced. The cavity should be hermetically sealed after the lining of oxychloride is introduced. If any of you will try this method of bleaching, you will be astonished at the results.

Dr. V. H. Jackson: I would like to ask the doctor if the teeth are inclined to return to their original dark color as in other cases?

Dr. Harlan: In those cases that have stood longer than a year there has been no tendency to a rediscoloration of the teeth.

Dr. Callahan: I have been waiting for some older persons than myself to answer the question of Dr. Watkins in reference to extracting the wisdom-teeth.

I had a case of a lady about thirty-five years of age, where I extracted the molar, and in about ten days afterwards the wisdom-tooth made its appearance.

Dr. V. H. Jackson: I had a patient who had been under a physician's care for neuralgia for about a year and a half. It was such an aggravated case that the lightest touch of his moustache would cause the most violent disturbance. The physician had used all methods known to him to relieve the patient of neuralgia, and had treated him both systemically and locally, and also for malaria. He was finally sent to me by the physician to see if there was anything about the teeth that could be the cause of the trouble. I found that one tooth was slightly sensitive to the rap of a metal instrument while the rest of them did not seem to be at all sensitive. I finally, on March 5, extracted the tooth, which was living, and found exostosis at the apex of the root. I was very anxious to save the tooth and I filled the end of the root and the pulp-canal, the crown having already been filled, and reset it.

The gentleman did not have any more neuralgia for about three months. His physician sent me word that I had done more for him in that one operation than he had been able to do in a year and a half of treatment; but on July 7 the gentleman appeared in my office again, and said he had another tooth which ought to be extracted and reset. I examined his mouth very carefully but did not find any symptoms which I thought would justify me in performing a similar operation to the one before made. I counseled with his physician, and told him if he had not tried electricity I should like to have him do so. The patient has not received any benefit as yet from the application of electricity.

I would like to hear from the gentlemen of the Association if they

know of any similar case, and what they can suggest on the subject.

[The following note was received just before going to press, and is inserted here as of peculiar interest.—Pub. Com.]

New York, Nov. 12, 1883.

The above case was benefited by constant use of electricity at the hands of an experienced electrician, Dr. Rockwell, and continued to improve till about Oct. 13, when the neuralgia returned with renewed vigor, but was on the other side of the face at this time. The patient wanted the first molar extracted, but finding by careful examination, Oct. 13, that the wisdom-tooth was tender upon the rap of an instrument I extracted that. The patient was instantly relieved and has remained so till this date. There was a slight exostosis at the apex of the root, only not so marked as before.

Dr. Atkinson: I would like to ask if the tooth which was exostosed had an antagonist?

Dr. Jackson: The arch was perfect with the exception of one wisdom-tooth.

Dr. Atkinson: Then the cure is to tie his mouth together at night so that he cannot sleep with it open.

Dr. S. G. Perry: Let me mention here that for years I have had a great deal of satisfaction in filling very large cavities with amalgam, and after it has crystallized cutting a narrow groove around the margins and filling with gold. With large approximal fillings which run under the gum this can be done only down to the gum margin, but I never look for early failure of amalgam fillings under the gum if they have been carefully finished there. According to my experience such large fillings fail first by the crumbling of the grinding surface borders. By anticipating this crumbling and filling with a narrow band of gold around the margins, permanent operations may be made. Of course, this is not to be done in cavities where gold can be used throughout, but in those large ones where it is desirable to restore the contour with a plastic material.

In this connection I will mention that I sometimes restore crowns upon the roots of the posterior molars by fitting around them a thin band of platinum, which I make as wide as the crown should be long when completed. Having dove-tailed the roots carefully I fill them and the band with amalgam, articulating the opposing tooth upon the amalgam while it is yet soft. The operation is a simple one, and very quickly and easily performed. The band having been fitted around the roots in the mouth and marked, can be soldered with gold in a moment at the chair, and the whole operation com-

pleted without help from the laboratory. Such crowns make very safe and strong masticators. Of course, they are permissible only when they can be kept out of sight.

Dr. Marcklein: We can hardly be too careful not to drive any material under the free margin of the gum. It is always an irritant to some extent. I have seen considerable of this irritation caused by the so-called Richmond crowns. I have seen a great deal of Dr. Richmond's own work, and also that of others, and I have almost always found that the gold extending under the free margin of the gum has been a very great irritant. The gum at the alveolar border has been absorbed, decay has recurred above the crowns, and the crowns have had to be removed. I have used the method that Dr. Perry has just described, and I think it answers fully as well as any other that I have seen.

Dr. Priest: There are many cases which require gentle treatment; such as feeble, aged, and infirm patients, children, and women during pregnancy and after child-birth. Successful operations may be made by filling the base of many approximal cavities with amalgam, mixed to harden quickly, and then gently packing the gold upon it. The amalgam will soon admit of sufficient pressure or malleting to pack the gold perfectly and make a permanent filling; thus saving the patient from great nervous strain, which sometimes prevents people from submitting to the torture of having teeth filled, they preferring to have them extracted. Many cavities may be lined with oxyphosphate cement and completed with gold with the best results,—giving great relief to the patient during and comfort after the operations.

Dr. Watkins: A year ago I was in Dr. Baker's office in Boston, and he described to me the method which he used for making fillings of amalgam and gold combined by applying thin copper bands such as Dr. Barrett described yesterday, around teeth where there were large approximal cavities in the bicuspids and molars. He then mixed his amalgam filling as dry as possible, packing it very hard into the bottom of the cavity, half-filling the cavity, and then removing all the upper part of the filling, which has the excess of mercury in it. He then immediately puts the gold in. The first few pieces of gold will be bedded into the amalgam, and after that he can build the gold without changing the amalgam at all, and complete the filling at the same sitting without having to wait for the amalgam to set.

In finishing the filling it is very easy to trim the amalgam around

the cervical wall. In filling in that way we may be positive that the entire cavity is filled to the walls, while in using gold exclusively in such cavities it would be very difficult to have such assurance.

I have used that method for a year, and find it a very useful one. Frequently in filling large cavities in molars I use oxyphosphate of zinc to half-fill the cavity, where I can cover it up so that moisture will not get to it, and then complete the operation with gold. I have used Dr. Robinson's material to a limited extent, and find that it works very nicely in just such cavities as I have described. It can be carried to the cervical wall and molded around all the walls very easily. Cavities can also be filled almost full, leaving the thinness of a piece of paper on the outer surface to be covered with gold. I have only used it for about six months, but it appears to do well.

TRANSACTIONS

OF THE

AMERICAN DENTAL ASSOCIATION

AT THE

TWENTY-FOURTH ANNUAL SESSION,

HELD AT SARATOGA SPRINGS,

COMMENCING ON THE 7TH OF AUGUST, 1884.

PUBLICATION COMMITTEE:

GEO. H. CUSHING. A. W. HARLAN. E. T. DARBY.

PHILADELPHIA:
THE S. S. WHITE DENTAL MANUFACTURING CO.
1885.

DISCLAIMER.

The American Dental Association, although formally accepting and publishing the reports of the various Standing Committees and the essays read before the Association, holds itself wholly irresponsible for the opinions, theories, or criticisms therein contained, except when otherwise decided by special resolution.—*Constitution.*

PRESS OF PATTERSON & WHITE,
PHILADELPHIA.

LIST OF OFFICERS FROM DATE OF ORGANIZATION.

PRELIMINARY CONVENTION, NIAGARA FALLS, AUGUST, 1859.

President,	W. W. ALLPORT . . .	Chicago.
Secretary,	J. TAFT	Cincinnati.

ORGANIZATION AND FIRST SESSION OF ASSOCIATION, WASHINGTON, D. C., JULY, 1860.

[Annual meetings to be hereafter last Tuesday in July.]

President,	W. H. ATKINSON . . .	Cleveland.
1st Vice-President,	J. B. GIBBS	Washington, D. C.
2d Vice-President,	W. CAHOON	Detroit, Mich.
Recording Secretary,	J. TAFT	Cincinnati.
Corresponding Secretary,	W. MUIR ROGERS . . .	Shelbyville, Ky.
Treasurer,	S. DILLINGHAM . . .	Philadelphia.

[NO MEETING IN 1861.]

CLEVELAND, JULY, 1862.

President,	GEO. WATT	Xenia, Ohio.
1st Vice-President,	W. H. ALLEN . . .	New York City.
2d Vice-President,	W. D. STONE . . .	Lexington, Ky.
Recording Secretary,	J. TAFT	Cincinnati.
Corresponding Secretary,	J. F. JOHNSTON . . .	Indianapolis.
Treasurer,	W. A. PEASE . . .	Dayton, Ohio.

PHILADELPHIA, JULY, 1863.

President,	W. H. ALLEN . . .	New York City.
1st Vice-President,	J. H. MCQUILLEN . . .	Philadelphia.
2d Vice-President,	WM. B. HURD . . .	Brooklyn, N. Y.
Recording Secretary,	J. TAFT	Cincinnati.
Corresponding Secretary,	C. R. BUTLER . . .	Cleveland.
Treasurer,	A. C. HAWES	New York City.

NIAGARA FALLS, JULY, 1864.

President,	J. H. MCQUILLEN . . .	Philadelphia.
1st Vice-President,	C. P. FITCH	New York City
2d Vice-President,	H. BENEDICT	Detroit.
Recording Secretary,	J. TAFT	Cincinnati.
Corresponding Secretary,	GEO. W. ELLIS . . .	Philadelphia
Treasurer,	I. J. WETHERBEE . . .	Boston.

Chicago, July, 1865.

President,	C. W. Spalding	St. Louis.
1st Vice-President,	Geo. H. Cushing	Chicago.
2d Vice-President,	Jas. McManus	Hartford.
Recording Secretary,	J. Taft	Cincinnati.
Corresponding Secretary,	L. D. Shepard	Boston.
Treasurer,	I. J. Wetherbee	Boston.

Boston, July, 1866.

President,	C. P. Fitch	New York City.
1st Vice-President,	W. H. Morgan	Nashville.
2d Vice-President,	L. D. Shepard	Boston.
Recording Secretary,	J. Taft	Cincinnati.
Corresponding Secretary,	A. Hill	Norwalk, Conn.
Treasurer,	W. W. Sheffield	New London, Conn.

Cincinnati, July, 1867.

President,	A. Lawrence	Lowell, Mass.
1st Vice-President,	P. G. C. Hunt	Indianapolis, Ind.
2d Vice-President,	A. S. Talbert	Lexington, Ky.
Recording Secretary,	J. Taft	Cincinnati.
Corresponding Secretary,	C. R. Butler	Cleveland.
Treasurer,	W. H. Goddard	Louisville, Ky.

Niagara Falls, July, 1868.

President,	Jonathan Taft	Cincinnati.
1st Vice-President,	Homer Judd	St. Louis.
2d Vice-President,	A. A. Blount	Springfield, Ohio.
Recording Secretary,	Edgar Park	St. Louis.
Corresponding Secretary,	Jas. McManus	Hartford.
Treasurer,	W. H. Goddard	Louisville.

Saratoga Springs, August, 1869.*

President,	Homer Judd	St. Louis.
1st Vice-President,	S. J. Cobb	Nashville.
2d Vice-President,	C. E. Francis	New York City.
Recording Secretary,	M. S. Dean	Chicago.
Corresponding Secretary,	I. A. Salmon	Boston.
Treasurer,	W. H. Goddard	Louisville.

* Owing to a change in the Constitution, officers elected at this and the sessions following served at the next annual meeting subsequent to their election; and the sessions of and after 1869 commenced on the first Tuesday in August.

NASHVILLE, AUGUST, 1870.

President,	W. H. MORGAN	Nashville.
1st Vice-President,	S. W. DENNIS	San Francisco.
2d Vice-President,	J. R. WALKER	New Orleans.
Recording Secretary,	M. S. DEAN	Chicago.
Corresponding Secretary,	I. A. SALMON	Boston.
Treasurer,	W. H. GODDARD	Louisville.

WHITE SULPHUR SPRINGS, VA., AUGUST, 1871.

President,	GEO. H. CUSHING	Chicago.
1st Vice-President,	C. E. FRANCIS	New York City.
2d Vice-President,	J. R. WALKER	New Orleans.
Recording Secretary,	M. S. DEAN	Chicago.
Corresponding Secretary,	I. A. SALMON	Boston.
Treasurer,	W. H. GODDARD	Louisville.

NIAGARA FALLS, AUGUST, 1872.

President,	P. G. C. HUNT	Indianapolis.
1st Vice-President,	L. D. SHEPARD	Boston.
2d Vice-President,	G. A. MILLS	Brooklyn, N. Y.
Recording Secretary,	M. S. DEAN	Chicago.
Corresponding Secretary,	J. TAFT	Cincinnati.
Treasurer,	W. H. GODDARD	Louisville.

PUT-IN-BAY, AUGUST, 1873.

President,	T. L. BUCKINGHAM	Philadelphia.
1st Vice-President,	ISAIAH FORBES	St. Louis.
2d Vice-President,	A. F. MCLAIN	New Orleans.
Recording Secretary,	M. S. DEAN	Chicago.
Corresponding Secretary,	J. TAFT	Cincinnati.
Treasurer,	W. H. GODDARD	Louisville.

DETROIT, AUGUST, 1874.

President,	M. S. DEAN	Chicago.
1st Vice-President,	GEO. W. KEELY	Oxford, Ohio.
2d Vice-President,	J. S. KNAPP	New Orleans.
Recording Secretary,	C. STODDARD SMITH	Springfield, Ill.
Corresponding Secretary,	GEO. L. FIELD	Detroit.
Treasurer,	W. H. GODDARD	Louisville.

NIAGARA FALLS, AUGUST, 1875.

President,	A. L. NORTHROP	New York City.
1st Vice-President,	H. J. MCKELLOPS	St. Louis.
2d Vice-President,	H. A. SMITH	Cincinnati.
Recording Secretary,	C. STODDARD SMITH	Springfield, Ill.
Corresponding Secretary,	J. H. MCQUILLEN	Philadelphia.
Treasurer,	W. H. GODDARD	Louisville.

PHILADELPHIA, AUGUST, 1876.

President,	GEO. W. KEELY . . .	Oxford, Ohio.
1st Vice-President,	C. N. PEIRCE . . .	Philadelphia.
2d Vice-President,	CORYDON PALMER . .	New York City.
Recording Secretary,	C. STODDARD SMITH . .	Springfield, Ill.
Corresponding Secretary,	J. H. MCQUILLEN . .	Philadelphia.
Treasurer,	W. H. GODDARD . . .	Louisville.

CHICAGO, AUGUST, 1877.

President,	F. H. REHWINKEL . .	Chillicothe, Ohio.
1st Vice-President,	L. D. SHEPARD . . .	Boston.
2d Vice-President,	GEO. T. BARKER . . .	Philadelphia.
Recording Secretary,	M. S. DEAN	Chicago.
Corresponding Secretary,	M. H. WEBB	Lancaster, Pa.
Treasurer,	W. H. GODDARD . . .	Louisville.

NIAGARA FALLS, AUGUST, 1878.

President,	H. J. MCKELLOPS . .	St. Louis.
1st Vice-President,	L. D. SHEPARD . . .	Boston.
2d Vice-President,	L. D. CARPENTER . . .	Atlanta, Ga.
Recording Secretary,	GEO. H. CUSHING . . .	Chicago.
Corresponding Secretary,	A. O. RAWLS . . .	Lexington, Ky.
Treasurer,	W. H. GODDARD . . .	Louisville.

NIAGARA FALLS, AUGUST, 1879.

President,	L. D. SHEPARD . . .	Boston.
1st Vice-President,	C. N. PEIRCE . . .	Philadelphia.
2d Vice-President,	GEO. L. FIELD . . .	Detroit.
Recording Secretary,	GEO. H. CUSHING . . .	Chicago.
Corresponding Secretary,	M. H. WEBB . . .	Lancaster, Pa.
Treasurer,	W. H. GODDARD . . .	Louisville.

BOSTON, AUGUST, 1880.

President,	C. N. PEIRCE . . .	Philadelphia.
1st Vice-President,	W. C. BARRETT . . .	Buffalo.
2d Vice-President,	GEO. J. FRIEDRICHS . .	New Orleans.
Recording Secretary,	GEO. H. CUSHING . . .	Chicago.
Corresponding Secretary,	A. M. DUDLEY . . .	Salem, Mass.
Treasurer,	W. H. GODDARD . . .	Louisville.

NEW YORK, JULY, 1881.

President,	H. A. SMITH	Cincinnati.
1st Vice-President,	W. C. BARRETT . . .	Buffalo.
2d Vice-President,	GEO. J. FRIEDRICHS . .	New Orleans.
Recording Secretary,	GEO. H. CUSHING . .	Chicago.
Corresponding Secretary,	A. M. DUDLEY . . .	Salem, Mass.
Treasurer,	W. H. GODDARD . . .	Louisville.

CINCINNATI, AUGUST, 1882.

President,	W. H. GODDARD . . .	Louisville.
1st Vice-President,	GEO. J. FRIEDRICHS . .	New Orleans.
2d Vice-President,	E. T. DARBY . . .	Philadelphia.
Recording Secretary,	GEO. H. CUSHING . . .	Chicago.
Corresponding Secretary,	A. W. HARLAN . . .	Chicago.
Treasurer,	GEO. W. KEELY . . .	Oxford, Ohio.

NIAGARA FALLS, AUGUST, 1883.

President,	E. T. DARBY . . .	Philadelphia.
1st Vice-President,	C. S. STOCKTON . . .	Newark, N. J.
2d Vice-President,	T. T. MOORE . . .	Columbia, S. C.
Recording Secretary,	GEO. H. CUSHING . . .	Chicago.
Corresponding Secretary,	A. W. HARLAN . . .	Chicago.
Treasurer,	GEO. W. KEELY . . .	Oxford, Ohio.

SARATOGA SPRINGS, AUGUST, 1884.

President,	J. N. CROUSE . . .	Chicago.
1st Vice-President,	M. W. FOSTER . . .	Baltimore.
2d Vice-President,	C. F. RICH	Saratoga.
Recording Secretary,	GEO. H. CUSHING . . .	Chicago.
Corresponding Secretary,	A. W. HARLAN . . .	Chicago.
Treasurer,	GEO. W. KEELY . . .	Oxford, Ohio.

EXECUTIVE COMMITTEE FOR SESSION OF 1885.

C. N. PEIRCE, Chairman. A. M. DUDLEY, Secretary.

FIRST DIVISION—COMMITTEE OF ARRANGEMENTS.

*J. N. CROUSE, *GEORGE L. FIELD, W. N. MORRISON.

SECOND DIVISION—ON CREDENTIALS, ETHICS, AND AUDITING ACCOUNTS.

*A. M. DUDLEY, S. G. PERRY, A. O. HUNT.

THIRD DIVISION—ON VOLUNTARY ESSAYS.

C. N. PEIRCE, L. D. SHEPARD, GEO. J. FRIEDRICHS.

LOCAL COMMITTEE OF ARRANGEMENTS.

A. T. SMITH, of Minneapolis; F. H. GARDINER, Chicago; and H. J. MCKELLOPS, St. Louis.

* These go out August, 1885.

CONTENTS.

	PAGE
Disclaimer	2
Officers from date of organization	3–7
Amended Constitution	13–28
Roll-call	29–33
Report of Programme	33
Time fixed for Clinics	33
Credentials, report on, by Executive Committee	33
Amendments to Constitution adopted	34, 40
Motion to appoint Committee on the death of Dr. Buckingham	34
Motion to appoint Committee to suggest means of increasing attendance	34
Publication Committee's Report	34
President's Address referred to Committee	35
Sections—time of meeting	35
Time set for hearing Dr. Williams's paper	35
Section VI. called	35
Motion to draw necessary orders on Treasurer	36
Executive Committee, filling vacancies on	36
Courtesies of the floor extended to gentlemen not members of the Association	36
Telegram received from Dr. T. T. Moore	36
Section VII. called	36
Sections organized	36
Dr. Williams's paper and Stereopticon Exhibition	37
Accident to child of Dr. Clifton announced	37
Local Committee of Arrangements instructed to endeavor to bring author of accident to justice	38
Committee instructed to secure nurses for Dr. Clifton's child	38
Report of Committee on death of Dr. Buckingham received and action thereon	38
Extract from a letter from Dr. Bödecker read	38
Dr. F. Y. Clark reinstated as a member	38
Dr. Crowell invited to state views and plans of the Dental Protective Union	39
Report from the president of the village of Saratoga in regard to Dr. Clifton's child	39
Section I. called	39
Section II. called	39
Resolutions offered by Section on Education adopted	39
Report of Committee of condition of Doctor Clifton's child	40
Report of Committee on President's Address	40

PAGE

Section III. called 40
Chairman of Section III. instructed 40
Section IV. called 40
Place of next meeting selected 41
Election of Officers 41
Treasurer instructed to honor draft of Dr. Clifton 41
Dr. Allport's personal explanation 41
Credentials Committee's final report adopted 41
Treasurer's Report 41
Executive Committee's Report auditing the Treasurer's and Publication Committee's accounts adopted 42
Thanks tendered to Mr. Clair of the Grand Union 42
Thanks tendered to various railroads 43
Thanks tendered to Local Committee of Arrangements 43
Installation of Officers 43
Communication from New Jersey State Dental Society 43
Publication Committee appointed 43
Local Committee of Arrangements appointed 43
Section V. called 43
Reading of minutes and adjournment 43
Memorial Pages 44–46

REPORTS AND VOLUNTEER PAPERS.

President's Address 47

Section VI.

Supplemental Report on Treatment of Pyorrhœa Alveolaris, by A. W. Harlan, Chairman 55

Section VII.

Report on Physiology and Etiology, by W. C. Barrett, Chairman . . 88

Section I.

Report by W. H. Trueman, Chairman 115
Paper on Artificial Dentistry, by John Allen 119
Paper entitled " Who are Dentists ? " by J. A. Robinson 122

Section II.

Report by C. N. Peirce, Chairman 130

Section III.

Report on Dental Literature, by J. Taft, Chairman 143

Section IV.

Report by Edwin T. Darby, Chairman. 150

SECTION V.

PAGE
Paper on Certain Disputed Points in the Development and Histology of the Teeth, by J. L. Williams 158

DISCUSSIONS.

SECTION VI.

Pyorrhœa Alveolaris—discussed by
Dr. Odell 61, 72
Dr. Bogue 62, 63
Dr. Harlan 62, 63, 81
Dr. Barrett 63, 65, 66
Dr. Atkinson 65, 66, 84
Dr. Shepard 68, 76, 83
Dr. Peirce 69, 73, 79
Dr. Rhein 71
Dr. Field 71
Dr. Allport 73
Dr. Jas. Truman 74
Dr. Searle 76, 79
Dr. Stockton 78
Dr. R. Finley Hunt 78
Dr. Watkins 80
Dr. How 81
Dr. E. Parmly Brown 83
Dr. F. Y. Clark 110

SECTION VII.

Micro-Organisms as the Cause of Caries—discussed by
Dr. Spalding 95, 100
Dr. Barrett 95, 100, 107, 113, 114
Prof. Mayr 96
Dr. Atkinson 96, 97, 104, 107
Dr. Abbott 102
Dr. Peirce 105, 107, 108
Dr. Searle 108, 112, 113
Dr. F. Y. Clark 108, 111, 112
Dr. Daboll 110, 111, 112, 113
Dr. Friedrichs 111, 112
Dr. Shepard 113
The President 114
Dr. R. Finley Hunt 114

SECTION I.

No discussion.

SECTION II.

Dental Education—discussed by
Dr. Spalding 134, 135, 137, 138, 139
Dr. Peirce 134, 135
Dr. R. Finley Hunt 135

PAGE

Dr. Friedrichs 136, 142
Dr. Allport 136, 138
Dr. Cook 137, 138
Dr. Atkinson 138, 140, 142
Dr. Abbott 139
Dr. Rhein 140
Dr. Robinson 140

SECTION III.

Dental Literature—discussed by

Prof. Mayr 148, 149
Dr. Taft 149
Dr. Friedrichs 149

SECTION IV.

Herbst's Method—discussed by

Dr. Atkinson 151
Dr. Abbott 151, 152
Dr. R. Finley Hunt 152
Dr. Daboll 152
Dr. Friedrichs 152
Dr. Stockton 153
Dr. Watkins 153, 157
Dr. Barrett 153
Dr. A. O. Hunt 154, 155
Dr. Crouse 155
Dr. Allport 156
Dr. Barker 156
Dr. F. Y. Clark 156
Dr. Rhein 157

SECTION V.

Histology and Development of the Teeth—discussed by

Dr. Atkinson 176
Dr. Rhein 177
The President 177
Dr. Cushing 177
Dr. Abbott 177, 180
Dr. Peirce 179
Dr. Spalding 179, 180

AMENDED CONSTITUTION.

ADOPTED AT SARATOGA, AUGUST, 1869, WITH AMENDMENTS UP TO AND INCLUDING THE SESSION OF 1884.

ARTICLE I.

NAME.

NAME.—This organization shall be known by the name of the AMERICAN DENTAL ASSOCIATION.

ARTICLE II.

OBJECTS.

OBJECTS.—The objects of this Association shall be to cultivate the science and art of Dentistry, and all its collateral branches; to elevate and sustain the professional character of Dentists, to promote among them mutual improvement, social intercourse, and good feeling, and collectively to represent and have cognizance of the common interests of the Dental Profession.

ARTICLE III.

DELEGATES FROM LOCAL SOCIETIES.

SECTION 1.—MEMBERSHIP; NUMBER OF DELEGATES FROM LOCAL SOCIETIES.—Each local society may send one for every five of its active members, and each Dental College one from its faculty as delegates to this Association for one year, upon complying with the requirements of its Constitution; but no society shall be entitled to representation that does not adopt or substantially recognize its Code of Ethics.

MEMBERS EXPELLED FROM LOCAL SOCIETIES.

SEC. 2.—EXPELLED MEMBERS.—Any member of this Association being expelled or suspended from his local society, shall from that date cease to be a member of this body. [Amended 1880.]

CLASSES OF MEMBERS and their Privileges.

SEC. 3.—MEMBERS TO BE OF THREE CLASSES.—The members of this Association shall be of three classes, viz.: Delegates, permanent, and honorary members; the two former classes having equal rights and privileges, except eligibility to office and membership of the Sections—none being eligible to hold office except permanent members; the latter class to consist of prominent, worthy members of the dental profession residing in foreign countries, who shall be elected by ballot.

HONORARY MEMBERS.

SEC. 4.—DELEGATES.—All delegates shall be practitioners of Dentistry; they shall receive their appointment only from permanently organized Dental Societies and Dental Colleges, having definite conditions of membership other than pecuniary, which shall have been approved by the Executive Committee, and a copy of which shall be in the hands of the Recording Secretary of this body.

DELEGATES. Qualifications and Appointment of.

After August, 1875, must be graduates.

This Association will hereafter receive no delegates, who shall after this date [August, 1875,] enter the profession without first having graduated at some reputable dental or medical college.

SEC. 5.—PERMANENT MEMBERS.—Permanent members shall consist of those who, having served one year as delegates, and complied with the requirements of the Association, shall signify to the Treasurer a desire for permanent membership. After the resignation of a member has been accepted, the Association may at any time thereafter reinstate such member by unanimous consent. [Amended 1881.]

PERMANENT MEMBERS.

Reinstatement of.

SEC. 6.—SIGNING CONSTITUTION.—Each new member, before voting or speaking on any subject before the meeting, shall sign these regulations, inscribing his name and the title and location of the institution from which he receives his appointment.

CONSTITUTION TO BE SIGNED before speaking or voting.

SEC. 7.—DUES.—Five dollars shall be paid to the Treasurer by each member yearly, as dues, before he can be eligible to office, or speak or vote on any sub-

DUES. Members cannot speak or vote, if unpaid.

ject before the Association; and in case the dues remain unpaid at the close of the second annual meeting thereafter, the name of any such delinquent shall be erased from the list of members without further action.

DUES. Penalty for failure to pay.

Sec. 8.—Giving Name on Rising.—No one shall be permitted to address the Association before giving his name and residence, which shall be distinctly announced from the Chair; nor shall he speak more than twice, nor longer than fifteen minutes in all, unless by consent of the Association.

ADDRESSING ASSOCIATION,— giving name on rising.

Sec. 9.—Conduct of Members.—Any act of special immorality or unprofessional conduct committed by a member of this Association shall be referred to the Executive Committee (Second Division), whose duty it shall be to thoroughly examine into the case, and report at the next meeting if the charges be sustained. Whereupon, by a vote, the offending member may be reprimanded or expelled, a two-thirds vote being required for expulsion, a majority being sufficient for reprimand.

IMMORAL OR UNPROFESSIONAL CONDUCT, how punished.

ARTICLE IV.

Time of Meetings.—The regular meetings of the Association shall be held annually, and commence on the first Tuesday in August. The place of meeting shall be determined each year by vote of the Association. After the selection of a place of meeting there shall be appointed by the President, annually, a committee of three, residing at or near the place selected for the next meeting, whose duty it shall be to procure rooms for meetings, clinics, and for the exhibition of mechanical appliances, and to make such other local arrangements as may be needed for the Association. This committee shall act under the direction of the First Division of the Executive Committee.

TIME OF MEETINGS.

PLACE OF MEETINGS.

LOCAL COMMITTEE OF ARRANGEMENTS.

Sec. 2.—The officers may, for extraordinary reasons change the time and place of meeting, upon the

TIME AND PLACE OF MEETING, how changed.

written consent of ten (10) of the fifteen (15) officers. [Amended 1882.]

ARTICLE V.

SECTION 1.—OFFICERS, HOW ELECTED.—The officers of this Association shall be a President, two Vice-Presidents, Corresponding Secretary, Recording Secretary, Treasurer, and the Executive Committee, who shall be elected by ballot without nomination. The three names, or in case of a tie, the four names having the greatest number of votes shall be the sole nominees in case of failure to elect on the first ballot, and a majority of all the votes cast for those names shall be necessary to a choice.

OFFICERS, How elected.

Each officer, except as otherwise provided, shall hold his appointment for one year, or until another is elected to succeed him.

Term of office.

SEC. 2.—PRESIDENT: DUTIES OF.—The President shall preside according to parliamentary usage, as laid down in "Cushing's Manual" and the Rules of Order adopted by this Association.

PRESIDENT, Duties of.

SEC. 3.—VICE-PRESIDENTS.—In the absence of the President, one of the Vice-Presidents shall perform the duties of the office, and in the absence of these officers a Chairman *pro tem.* shall be appointed by acclamation.

VICE-PRESIDENTS, Duties of.

SEC. 4.—CORRESPONDING SECRETARY.—The Corresponding Secretary shall attend to the correspondence of the Association with the societies therein represented, and to correspondence with other scientific bodies as may be desirable.

CORRESPONDING SECRETARY, Duties of.

SEC. 5.—RECORDING SECRETARY.—The Recording Secretary shall keep accurate minutes of the proceedings of the Association, preserve the archives and unpublished documents, and attend to the other duties that pertain to his office. He shall be *ex-officio* chairman of the Publication Committee, and shall see that due notice is given of the time and place of meeting of the Association.

RECORDING SECRETARY, Duties of.

Ex-officio Chairman of Publication Committee.

SEC. 6.—EXECUTIVE COMMITTEE.—The Executive Committee shall be the business committee of the Association, and shall consist of nine members, to whom shall be referred all business not otherwise specially provided for. They shall report at each meeting under the proper head their doings for the current year.

EXECUTIVE COMMITTEE, Duties of, in general.

SUB-COMMITTEES.—FIRST DIVISION: COMMITTEE OF ARRANGEMENTS.—Three members of this committee shall act as the Committee of Arrangements, and shall procure suitable accommodations for the meetings and clinics, and for the exhibition and examination of appliances, of which they shall have the charge. These three shall attend generally to the wants of the Association during its session.

FIRST DIVISION: Committee of Arrangements.

SECOND DIVISION: CREDENTIALS AND AUDITING COMMITTEE.—Other three shall examine and verify the credentials and qualifications of members, including all violations of the Code of Ethics and the Constitution, and shall also be the Auditing Committee for that year.

SECOND DIVISION: Credentials and Auditing Committee.

THIRD DIVISION: COMMITTEE ON VOLUNTEER ESSAYS.—The remaining three shall examine all volunteer essays, and before they are read to the Association shall give their approval, in order that time may not be taken up by unworthy or irrelevant matter.

THIRD DIVISION: Committee on Voluntary Essays.

They shall report the names of places for the next meeting.

To report places for meeting.

PUBLICATION COMMITTEE: HOW APPOINTED.—The President shall appoint two members of this Association, who shall act in conjunction with the Recording Secretary as the Publication Committee. They shall be authorized to employ a competent reporter to furnish an accurate report of the proceedings of each meeting.

PUBLICATION COMMITTEE, how appointed.

INSTRUCTIONS TO THE PUBLICATION COMMITTEE.—They shall superintend the publication and distribution of such portions of the Transactions as the

PUBLICATION COMMITTEE, Instructions to.

Association may direct, or the committee judge to be of sufficient value. They shall specify in the annual report of this committee the character and cost of the publications of the Association during the year, and the number of copies still on hand. Any report or other paper to be entitled to publication in the volume of the Transactions for the year in which it shall be presented to the Association must be placed in the hands of the Publication Committee on or before the first day of September, and must also be so prepared that the proof-sheets furnished the authors shall be returned to the committee without material alteration or addition.

REPORTS AND PAPERS must be in their hands when.

Every paper received by this Association, and all plates or other means of illustration, shall be considered the exclusive property of the Association, and shall be published for its benefit. [Amended 1880.]

Papers the property of the Association.

Disclaimer.—This committee is hereby instructed to print at the beginning of each volume of the Transactions the following disclaimer, viz.: "The American Dental Association, although formally accepting and publishing the reports of the various Standing Committees, and the essays read before the Association, holds itself wholly irresponsible for the opinions, theories, or criticisms therein contained, except when otherwise decided by special resolution."

DISCLAIMER.

Reports of Sub-Committees.—Each of these subcommittees shall report from time to time, as may be necessary, to the Executive Committee as a whole, who shall decide upon such report, if possible; but in case of their inability to decide upon any matter, it shall be brought before the Association for its decision as early as practicable.

REPORTS OF SUB-COMMITTEES.

Classification of Executive Committee.—At the first election of this committee, the first three shall be elected to serve three years, the second three for two years, and the last three for one year, and thenceforward three new members shall be elected each year

EXECUTIVE COMMITTEE, Classification of.

by ballot, to serve three years, and in case of the absence of any member of this committee his place may be temporarily filled by the remaining members of the committee.

MEETINGS OF EXECUTIVE COMMITTEE.—The Executive Committee shall, if possible, meet for consultation and arrangement of their respective duties on the day preceding the annual meeting of the Association, and shall meet for the examination of credentials, the arrangement of appliances, and the reception of papers, and such other business as may properly come before them at 8 A.M. on the day of the annual meeting.

EXECUTIVE COMMITTEE, Meetings of.

SUBDIVISION OF EXECUTIVE COMMITTEE.—They shall also meet after the election of new members to the committee to choose their own chairman and secretary, and to divide themselves into sub-committees as hereinbefore provided, and for the purposes described.

EXECUTIVE COMMITTEE, Subdivision of.

CHAIRMAN MAY CONVENE THE COMMITTEE.—The chairman of this committee may at his own discretion summon the members thereof to a meeting at any suitable hour during the sessions of the Association.

EXECUTIVE COMMITTEE, Chairman of, may convene.

SEC. 7.—TREASURER TO ATTEND TO RECEIVE DUES AT 8 A.M.—The Treasurer shall hold all the moneys belonging to theAssociation, and shall keep an accurate account as between the Society and its members. He shall attend the meeting of the Executive Committee at 8 A.M. on the day of the annual meeting to receive dues, and shall attend at roll-call to verify the list of names, checking all such as are in arrears for dues; he shall restore such names upon payment of dues within the legal limits, and shall notify all whose names may be erased from the list of membership. He shall pay the drafts of the President, countersigned by the Secretary, upon vote of the Society only, and shall report to the Executive Committee, where his

TREASURER, Duties of.

accounts shall be audited and by whom his report shall be presented to the Association, together with their own.

APPROPRIATION OF MONEY.

All resolutions appropriating money, except for the legitimate expenses of this Association, shall require a two-thirds vote of all the members present. [Amended 1883.]

ARTICLE VI.

[Amended (Sections 1, 2, and 3) 1884.]

PERMANENT SECTIONS, Division of.

SECTION 1.—To prepare, arrange, and expedite business, this Association shall be divided into seven Sections, as follows:

1. Prosthetic Dentistry, Metallurgy, and Chemistry.
2. Dental Education.
3. Dental Literature and Nomenclature.
4. Operative Dentistry.
5. Anatomy, Histology, and Microscopy.
6. Pathology, Therapeutics, and Materia Medica.
7. Physiology and Etiology. [Amended 1881.]

PERMANENT SECTIONS, Organization of.

SEC. 2.—It shall be the duty of each permanent member to inform the Recording Secretary, before the close of the morning session of the second day of the annual meeting, which of the seven Sections he elects to join for the ensuing year. He shall be free to follow his own preferences as to the particular channel in which he will labor, but can be a member of but one Section during the same year.

[But he may present volunteer papers to any of the other Sections.—SEC'Y.]

PERMANENT SECTIONS, Time and manner of organization of.

SEC. 3.—It shall be the duty of the Recording Secretary, immediately before the close of the above morning session of the second day, to make out lists of the names thus furnished of each Section, as a basis for the election of officers of said Sections, whereupon the Sections shall immediately proceed to the

election of chairmen and such other officers as they may see fit.

SEC. 4.—The chairman shall preside at all meetings of his Section; shall exercise general supervision over the business, and shall see that the labors of his Section are conducted in the manner calculated to secure the best results. The chairman, or such other member or members as the Section shall select, shall prepare and read at the annual meeting of the Association next ensuing a paper or papers on the advances and discoveries of the past year in the branches included in the Section. The reading of such papers shall not together occupy more than forty minutes.

PERMANENT SECTIONS, Duties of Chairmen of.

SEC. 5.—The several Sections shall meet at 10 A.M. on the morning of the first day of the annual meeting of the Association.

PERMANENT SECTIONS, Time of meeting of.

SEC. 6.—For the information of all members, a list of the members of each Section shall be published in the Transactions of each year. [Amended 1878.]

PERMANENT SECTIONS, List of members of, to be published.

ARTICLE VII.

QUORUM.—Fifteen members shall constitute a quorum for the transaction of business in this Association.

QUORUM FOR BUSINESS.

ARTICLE VIII.

SUSPENDING RULES: THREE-FOURTHS TO VOTE.—This order of business may be temporarily suspended by a three-fourths vote of all the members present, for the consideration of a specific subject, upon the completion of which the regular order shall be at once resumed.

SUSPENSION OF RULES, how made.

RULES OF ORDER.

1. On the arrival of the hour of meeting, the President shall take the chair, call to order, and announce that the meeting is open for business.

2. No motion or speech shall be in order until the mover or speaker shall have been recognized and assigned the floor by the Chair, nor shall a motion be open for debate until seconded and stated by the Chair.

3. At the request of any member a motion shall be put in writing.

4. At the request of five members a question shall be divided, or the yeas and nays ordered.

5. When a question is under debate, no other motion shall be in order, except—1st, to adjourn; 2d, to lay on the table; 3d, the previous question; 4th, to postpone; 5th, to commit; 6th, to amend; and these motions shall take precedence in the order here stated.

6. The previous question, and the motions to adjourn, to lay on the table, and to postpone, shall be decided without debate.

7. A motion to adjourn shall always be in order, but no member can make such a motion while another is speaking, or while a vote or ballot is being taken.

8. A second amendment to the main question shall not be in order until the first is disposed of, nor shall there be an amendment of an amendment to an amendment.

9. After a motion has been seconded and stated by the Chair, it shall not be withdrawn without the consent of the Society.

10. No member shall interrupt another while speaking, except to call him to order.

11. When called to order, a member shall sit down until the point of order is decided by the Chair, or, in case of appeal, by the Society.

If the point of order be sustained, the member can proceed in order by the consent of the Society.

12. Every member shall vote upon a question unless excused by the Society.

13. When any motion, except to adjourn, has been rejected, it shall not be renewed without unanimous consent.

14. Any member who voted in the majority may move a reconsideration of that question, but if that motion shall be lost or laid upon the table, it shall not be renewed without unanimous consent.

15. The President may vote with the members upon all questions, but having so voted, shall not give the casting vote in case of a tie.

16. Motions for filling blanks shall be put in the order in which they are moved.

17. On a division, or in voting by yeas and nays, any member may change his vote before the result is declared.

18. These rules may be suspended by unanimous consent.

ORDER OF BUSINESS.

1. Meeting of the Executive Committee, filling of vacancies therein, examination of credentials, and payment of dues, 8 A.M.

2. Meetings of the Sections at 10 A.M.

3. Organization of the Association at 11 A.M.

4. Calling the roll of qualified members.

5. Reading of the minutes and action thereon.

6. The reading and consideration of the stated annual reports from the Sections, together with volunteer papers upon the same subjects in their consecutive order.

7. Report of Executive Committee.

8. Balloting for the place of next annual meeting.

9. Election of officers and three members of Executive Committee.

10. Instructions to the permanent committees.

11. Unfinished, new, and miscellaneous business.

12. Adjournment.

AMENDMENTS.

Alterations and amendments may be made in the foregoing Articles or Rules of Order at any annual meeting, by the consent of all the members present. Otherwise notification in writing shall be made of any such proposed alterations or amendments, and laid over for one year for final action, when they can only be adopted by an affirmative vote of two-thirds of the members present.

STANDING RESOLUTIONS.

The following standing resolutions are in force at this time, August 1, 1885.

Resolved, That henceforth no person shall be received as a delegate who is in arrears for dues, or until he has paid to the Treasurer the full amount due at the time his name was dropped for non-payment.

Adopted August, 1874.

Resolved, That hereafter no dental college shall be entitled to representation in this Association that does not require a good English education as a preliminary qualification for its matriculants, to be ascertained by examination.

Adopted August, 1879.

Resolved, That in order to secure representation in this Association, dental colleges must, subsequent to October, 1881, require all students entering therein to take two full courses of lectures previous to coming forward for examination

and graduation, and must also state these conditions in their next annual announcement.

Adopted August, 1880.

Resolved, That hereafter no society shall be entitled to representation in this Association that does not require its members to live up to the requirements of our Code of Ethics.

Resolved, When it comes to the knowledge of the Committee on Credentials that any applicant for membership is violating our Code, said applicant shall not be received, and all such applicants shall be referred by the committee to the societies whose delegates they are, and in no case shall this Association be compelled to treat with violations of the Code, except where the violator is a member of this body and has no membership in any local society.

Adopted 1881.

Resolved, That the Secretary be instructed to assign members who may neglect to make their own choice the Section in which they are expected to work.

Adopted 1879.

Resolved, That the reports of Sections shall be called by the President in consecutive order, beginning each succeeding year one number higher than on the preceding year.

1879 commencing with No. I.
1880 " " No. II.
1881 " " No. III.
1882 " " No. IV.
1883 " " No. V.
1884 " " No. VI.
1885 " " No. VII.
1886 " " No. I.

Adopted 1879.

CODE OF DENTAL ETHICS.*

ARTICLE I.

THE DUTIES OF THE PROFESSION TO THEIR PATIENTS.

SECTION 1.—The dentist should be ever ready to respond to the wants of his patrons, and should fully recognize the obligations involved in the discharge of his duties toward them. As they are, in most cases, unable to correctly estimate the character of his operations, his own sense of right must guarantee faithfulness in their performance. His manner should be firm, yet kind and sympathizing, so as to gain the respect and confidence of his patients; and even the simplest case committed to his care should receive that attention which is due to any operation performed on living, sensitive tissue.

SEC. 2.—It is not to be expected that the patient will possess a very extended or a very accurate knowledge of professional matters. The dentist should make due allowance for this, patiently explaining many things which may seem quite clear to himself, thus endeavoring to educate the public mind so that it will properly appreciate the beneficent efforts of our profession. He should encourage no false hopes by promising success where, in the nature of the case, there is uncertainty.

SEC. 3.—The dentist should be temperate in all things, keeping both mind and body in the best possible health, that his patients may have the benefit of that clearness of judgment and skill which is their right.

ARTICLE II.

MAINTAINING PROFESSIONAL CHARACTER.

SECTION 1.—A member of the dental profession is bound to maintain its honor, and to labor earnestly to extend its sphere of usefulness. He should avoid everything in language and conduct calculated to discredit or dishonor his profession, and should ever manifest a due respect for his brethren. The young should show special respect to their seniors; the aged special encouragement to their juniors.

*Adopted August, 1866.

SEC. 2.—The person and office arrangements of the dentist should indicate that he is a gentleman; and he should sustain a high-toned moral character.

SEC. 3.—It is unprofessional to resort to public advertisements, such as cards, hand-bills, posters, or signs calling attention to peculiar styles of work, prices for services, special modes of operating, or to claim superiority over neighboring practitioners; to publish reports of cases, or certificates in the public prints; to go from house to house soliciting or performing operations; to circulate or recommend nostrums, or to perform any other similar acts. But nothing in this section shall be so construed as to imply that it is unprofessional for dentists to announce in the public prints, or by card, simply their names, occupation, and place of business; or in the same manner, to announce their removal, absence from, or return to business; or to issue, to their patients, appointment cards having a fee bill for professional services thereon.

SEC. 4.—When consulted by the patient of another practitioner the dentist should guard against inquiries or hints disparaging to the family dentist, or calculated to weaken the patient's confidence in him; and, if the interests of the patient will not be endangered thereby, the case should be temporarily treated, and referred back to the family dentist.

SEC. 5.—When general rules shall have been adopted by members of the profession practicing in the same localities, in relation to fees, it is unprofessional and dishonorable to depart from these rules, except when variation of circumstances requires it. And it is ever to be regarded as unprofessional to warrant operations or work as an inducement to patronage.

ARTICLE III.

THE RELATIVE DUTIES OF DENTISTS AND PHYSICIANS.

Dental surgery is a specialty in medical science. Physicians and dentists should both bear this in mind. The dentist is professionally limited to diseases of the dental organs and the mouth. With these he should be more familiar than the general practitioner is expected to be; and, while he recognizes the superiority of the physician in regard to diseases of the general system, the latter is under equal obligations to respect his higher attainments in his specialty. Where this principle governs, there can be no conflict, or even diversity, of professional interests.

ARTICLE IV.

THE MUTUAL DUTIES OF THE PROFESSION AND THE PUBLIC.

Dentists are frequent witnesses, and at the same time the best judges, of the impositions perpetrated by quacks, and it is their duty to enlighten and warn the public in regard to them. For this and the many other benefits conferred by the competent and honorable dentist, the profession is entitled to the confidence and respect of the public, who should always discriminate in favor of the true man of science and integrity, and against the empiric and impostor. The public has no right to tax the time and talents of the profession in examinations, prescriptions, or in any way, without proper remuneration.

MINUTES OF TRANSACTIONS

OF THE

AMERICAN DENTAL ASSOCIATION.

SESSION OF 1884.

BY GEO. H. CUSHING, SECRETARY.

FIRST DAY—MORNING SESSION.

THE AMERICAN DENTAL ASSOCIATION commenced its Twenty-fourth Annual Session in the Court Chambers, Saratoga Springs, N. Y., on Tuesday, August 5, 1884, at 11 o'clock A. M., the President, E. T. Darby, in the chair.

Prayer was offered by the Rev. Dr. Joseph Cary.

The roll of members was then called, and the following were found either to be present or to have forwarded their dues:

ATKINSON, W. H.	41 East Ninth st., New York.
ABBOTT, FRANK	22 West Fortieth st., New York.
*ALLEN, E. H.	Freeport, Ill.
ALLEN, JOHN	7 West Thirty-third st., New York.
ALLPORT, W. W.	240 Wabash ave., Chicago, Ill.
*AMES, W. B.	34 Monroe st., Chicago, Ill.
AMBLER, J. G.	16 East Forty-second st., New York.
*BROWN, S. B.	Fort Wayne, Ind.
BARRETT, W. C.	11 West Chippewa st., Buffalo, N. Y.
*BUTLER, C. R.	519 Euclid ave., Cleveland, Ohio.
*BAIRD, W. H.	Burlington, Iowa.
*BAUER, JOSEPH	130 Esplanade st., New Orleans, La.
BISHOP, J. ADAMS	32 West Thirty-sixth st., New York.
BOGUE, E. A.	29 East Twentieth st., New York.
BROWN, E. PARMLY	Flushing, Long Island, N. Y.

* Those marked thus were absent, but sent their dues.

d Those marked thus were delegates. and not permanent members.

*Boice, Alonzo	1612 Vine st., Philadelphia, Pa.
*Brackett, C. A.	102 Touro st., Newport, R. I.
*Brockway, A. H.	13 Greene ave., Brooklyn, N. Y.
*Brophy, Truman W.	125 State st., Chicago, Ill.
*Brown, Ira	225 Detroit st., Cleveland Ohio.
*Beck, C. S.	53 North Main st., Wilkesbarre, Pa.
Booth, Charles F.	Canandaigua, N. Y.
Barlow, F. C.	646 Jersey ave., Jersey City, N. J.
d. Barker, William	Providence, R. I.
d. Brewster, Richard C.	134 Lafayette ave., Brooklyn, N. Y.
*Bullock, C.	Cambridgeport, Mass.
*Cowie, Henry	Detroit, Mich.
Colgrove, W. H.	Johnstown, N. Y.
Cushing, George H.	34 Monroe st., Chicago, Ill.
Crouse, J. N.	2101 Michigan ave., Chicago, Ill.
*Chaim, M. L.	18 Cooper Union, New York.
Cook, C. D.	133 Pacific st., Brooklyn, N. Y.
Clifton, W. R.	Waco, Texas.
Clark, F. Y.	35 West Thirty-fifth st., N. Y.
*Cleland, James	31 State st., Detroit, Mich.
*Clement, C. W.	939 Elm st., Manchester, N. H.
*Colton, Aaron	Hudson, N. Y.
Darby, E. T.	1513 Walnut st., Philadelphia, Pa.
*Dunn, Charles E.	Louisville, Ky.
Dudley, A. M.	304 Essex st., Salem, Mass.
*Devore, J. H.	Corry, Pa.
Daboll, G. C.	Buffalo, N. Y.
*Dutch, William	22 Montgomery st., San Francisco, Cal.
*Emminger, A. F.	182 Broad st. Columbus, Ohio.
*Freeman, S. A.	14 Court st., Buffalo, N. Y.
Farrar, J. N.	Apartment No. 1 Rensselaer, cor. Broadway and Thirty-second st., New York.
*Fundenberg, W. H.	323 Penn ave., Pittsburg, Pa.
Finley, M. F.	Washington, D. C.
Field, George L.	Detroit, Mich.
Friedrichs, G. J.	155 St. Charles st., New Orleans, La.
Foster, M. W.	48 Franklin st., Baltimore, Md.
*Francis, Charles E.	33 West Forty-seventh st., New York.
*Freeman, A. W.	N. W. cor. State and Madison sts., Chicago, Ill.
*Fillebrown, Thomas	Portland, Maine.
Gaylord, E. S.	New Haven, Conn.
Guilford, S. H.	1513 Walnut st., Philadelphia, Pa.
Gardiner, Frank H.	126 State st., Chicago, Ill.
*Gilmer, T. L.	Quincy, Ill.
Gibbons, David	Warren, Ohio.
*Harroun, C. H.	115 Summit st., Toledo, Ohio.

* Hill, J. L.	Gettysburg, Pa.
Hooper, J.	828 Fourth ave., Louisville, Ky.
* Hoysradt, G. W.	Ithaca, N. Y.
Harlan, A. W.	70 Dearborn st., Chicago, Ill.
* Honsinger, E.	318 Park ave., Chicago, Ill.
* Holmes, E. S.	Grand Rapids, Mich.
Hunter, Frank A.	123 West Seventh st., Cincinnati, O.
How, W. Storer	Chestnut st., cor. Twelfth, Phila., Pa.
Hunt, A. O.	Iowa City, Iowa.
Hodge, S. D.	Burlington, Vt.
Hawes, Earl P.	Providence, R. I.
Horne, R. F.	Watertown, Mass.
Hunt, R. Finley	1113 F st., N. W., Washington City, D. C.
Holbrook, Charles W. F.	Newark, N. J.
* Hacker, T. S.	28½ East Ohio st., Indianapolis, Ind.
* Horton, W. P.	177 Euclid ave., Cleveland, Ohio.
* Ingersoll, L. C.	Keokuk, Iowa.
* Jackson, H. H.	317 Jefferson ave., Detroit, Mich.
Jackson, V. H.	51 East One hunded and Twenty-fifth st., New York.
Jefferis, C. R.	908 King st., Wilmington, Del.
Keely, George W.	cor. High and Main sts., Oxford, Ohio.
* Keely, Chas. I.	cor. High and Third sts., Hamilton, O.
* Kingsbury, C. A.	1119 Walnut st., Philadelphia, Pa.
* Keith, H. H.	1515 Washington ave., St. Louis, Mo.
Kingsley, Norman W.	25 West Twenty-seventh st., New York.
Keech, Edward P.	127 North Charles st., Baltimore, Md.
* Knowles, Samuel E.	S. E. cor. Post and Dupont sts., San Francisco, Cal.
* Leiter, Thos. C.	Wadsworth, Ohio.
* Lathrop, Joseph	152 Woodward ave., Detroit, Mich.
d. Lewis, James	Burlington, Vt.
Levy, Fred A.	Orange, N. J.
* Morrison, W. N.	1337 Washington ave., St. Louis, Mo.
McManus, James	Hartford, Conn.
McKellops, H. J.	2630 Washington ave., St. Louis, Mo.
Moore, E. C.	27 Lafayette ave., Detroit, Mich.
* Moore, T. T.	Columbia, S. C.
McElhaney, G. W.	Columbus, Ga.
Merritt, Charles	39 West Forty-second st., New York.
Meloney, C. W.	54 West Forty-eighth st., New York.
Meeker, Chas. A.	27 Fulton st., Newark, N. J.
* Marcklein, B. G.	Iron block, Milwaukee, Wis.
* Noble, H. B.	1111 Penna. ave., Washington, D. C.
* Northrop, A. L.	44 West Forty-sixth st., New York.
Odell, F. M.	7 West Thirty-eighth st., New York.
Osgood, Charles H.	147 Tremont st., Boston, Mass.

Peirce, C. N.	1415 Walnut st., Philadelphia, Pa.
* Perry, S. G.	46 West Thirty-seventh st., New York.
* Priest, A. N.	Utica, N. Y.
Peterson, Denton E.	Waterloo, N. Y.
Palmer, J. W.	Fitchburg, Mass.
* Palmer, S. B.	39½ Warren st., Syracuse, N. Y.
d. Pinney, Worthington	72 Park place, Newark, N. J.
* Page, W. E.	Room 11, Studio building, Boston, Mass.
* Patterson, J. D.	S. W. cor. Eighth and Main sts., Kansas City, Mo.
* Pruyn Charles P.	70 Dearborn st., Chicago, Ill.
Robinson, J. A.	Jackson, Mich.
* Rhone, J. W.	Bellefonte, Pa.
Rhein, M. L.	7 West Thirty-eighth st., New York.
Rich, C. F.	Saratoga, N. Y.
* Richter, R. G.	128 Wisconsin st., Milwaukee, Wis.
Smith, H. A.	286 Race st., Cincinnati, O.
* Starbuck, W. C.	Jamaica Plain, Mass.
* Smith, J. H.	New Haven, Conn.
Shepard, L. D.	100 Boylston st., Boston, Mass.
* Smith, Eugene H.	283 Dartmouth st., Boston, Mass.
Stockton, C. S.	Newark, N. J.
* Swain, E. D.	65 Randolph st., Chicago, Ill.
* Stevens, S. G.	Lynn, Mass.
d. Spalding, C. W.	1525 Olive st., St. Louis, Mo.
Swasey, J. A.	3003 Michigan ave., Chicago, Ill.
d. Searle, Flavius	Springfield, Mass.
Smith, A. T.	Minneapolis, Minn.
Taft, J.	122 West Seventh st., Cincinnati, O.
* Toledo, M. V.	113 East Eighteenth st., New York.
Trueman, W. H.	900 Spruce st., Philadelphia, Pa.
* Tillinghast, W. H.	Providence, R. I.
Timme, C. A.	190 Hudson st., Hoboken, N. J.
* Viet, M.	12 Dauphin st., New Orleans, La.
* Watling, J. A.	Ypsilanti, Mich.
* Wendell, W. C.	Iron block, Milwaukee, Wis.
* Waters, G. F.	8 Beacon st., Boston, Mass.
* Williams, I.	New Philadelphia, Ohio.
* Wilson, I. P.	Burlington, Iowa.
* Werner, J. G. W.	41 Upton st., Boston, Mass.
Watkins, S. C. G.	Mont Clair, N. J.
Wadsworth, T. A.	159 West Thirty-fourth st., New York.
White, Samuel A.	Savannah, Ga.
Walker, William Wallace	67 West Ninth st., New York.
Walton, J. C.	Howell, Mich.
Williams, J. L.	632 Chapel st., New Haven, Conn.
Wingerter, C. A.	Wheeling, W. Va.

WASSALL, J. W.	Room 32, 103 State st., Chicago, Ill.
WADSWORTH, E. C. . . .	53 Bedford ave., Brooklyn, N. Y.

[*] Any inaccuracies in the above list, either of names or locations, should be reported to the Treasurer at once, in order that the necessary correction of the record may be made.

Annual dues being payable in advance, no name appears on above list except those who have paid for 1884, and Transactions are not sent to any who have not fully paid their dues.

On motion, the reading of the minutes of the last session was dispensed with.

The Executive Committee made a report of programme, which was accepted and adopted.

On motion of Dr. Odell, the time from three to seven o'clock on Wednesday afternoon was set apart for clinics.

The Executive Committee made a partial report on credentials, which was subsequently completed, accepted, and adopted, as follows:

Brooklyn Dental Society—C. D. Cook, R. C. Brewster, E. C. Wadsworth, J. N. Farrar.

Connecticut Valley Dental Association—James McManus, J. L. Williams.

Chicago Dental Society—A. W. Harlan, J. A. Swasey, J. N. Crouse, F. H. Gardiner.

Dental Society of the State of New York—J. G. Ambler, C. F. Rich, W. W. Walker.

Dental Association of Maryland and District of Columbia—M. W. Foster, Edward P. Keech.

First District Dental Society of the State of New York—T. A. Wadsworth.

Illinois State Dental Society—George H. Cushing, W. W. Allport, J. W. Wassall.

Iowa State Dental Association—A. O. Hunt.

Kentucky Dental Association—J. Hooper.

Michigan Dental Association—J. C. Walton.

Minnesota State Dental Association—A. T. Smith.

New England Dental Society—S. D. Hodge, R. F. Horne, A. M. Dudley, J. W. Palmer, F. Searle, Wm. Barker.

New Jersey State Dental Society—C. A. Timme, F. A. Levy, Chas. A. Meeker, F. C. Barlow, C. S. Stockton, Worthington Pinney, Chas. W. F. Holbrook.

Odontological Society of Pennsylvania—C. R. Jefferis.

Ohio Valley Dental Society—Charles A. Wingerter.

Ohio State Dental Society—David Gibbons.

Pennsylvania State Dental Society—W. H. Trueman.

St. Louis Dental Society—C. W. Spalding.

Sixth District Dental Society of the State of New York—W. C. Stewart.

Seventh District Dental Society of the State of New York—Charles F. Booth.

Society of the Alumni of the Dental Department of the University of Pennsylvania—Earl P. Hawes.

Washington City Dental Society—R. Finley Hunt.

On motion of Dr. Cushing, the following amendment to the Constitution was unanimously adopted—to take effect at once: To amend sect. 2 of Art. VI. by changing "*third* day" to "*second* day." Also, sect. 3 of Art. VI. by changing the word "*after*" to "*before*," and "*third* day" to "*second* day," and to add the following after the last word, "Sections," "whereupon the Sections shall immediately proceed to the election of chairmen, and such other officers as they may see fit," and to strike out sects. 4 and 5, and change the numbers of sects. 6, 7, and 8 to 4, 5, and 6.

The President then read the annual address.

On motion of Dr. Ambler so much of the President's address as referred to the death of Dr. Buckingham was referred to a committee of three, who were afterwards appointed, as follows: J. G. Ambler, chairman; J. Taft and John Allen.

Dr. McKellops moved that the following committee be appointed to suggest some means of increasing the attendance upon this Association: E. Parmly Brown, chairman; G. W. McElhaney, A. W. Harlan, J. Taft, and M. W. Foster. Adopted.

The Publication Committee made the following report, which was accepted and referred to the Executive Committee, who subsequently reported it back with their approval:

SARATOGA SPRINGS, August 5, 1884.

The Publication Committee would report that, under the standing instructions of the Association, they made the same arrangement with The S. S. White Dental Manufacturing Co. as in former years, whereby the Transactions were furnished to the Association free of cost; the work has been done as admirably as heretofore, and the committee desire to renew their thanks to Mr. Hise for his care in the supervision of his part of the work, and for the great assistance he has afforded the committee.

The Transactions were mailed March 5, 1884, to all entitled to them, including the libraries, universities, journals, and honorary members, and since that date to those members who the Treasurer notified the committee had subsequently paid their dues. There are now in the hands of the committee about thirty copies.

The receipts and expenditures of the committee are as follows:

Received from Treasurer	$25 00	
" " sale of Transactions	2 00	
		$27 00
Expended for expressage, paper, and copying	$8 80	
" " printing notices	2 50	
" " postage and incidental expenses	18 75	
		30 05
Balance due the committee		$3 05

All of which is respectfully submitted.

GEO. H. CUSHING, *Chairman.*

SARATOGA, August 5, 1884. Audited and approved.

J. N. CROUSE,
A. M. DUDLEY, } *Auditing Committee.*

On motion of Dr. Stockton so much of the President's address as had not already been referred to other committees was referred to the committee named by Dr. McKellops.

Dr. Taft moved that we adjourn at 1 P. M., and that the Sections meet immediately thereafter. Carried.

Adjourned at 1 P. M. to meet at 8 P. M.

FIRST DAY—EVENING SESSION.

The Association met at 8.10 P. M., President Darby in the chair.

The minutes of the morning session were read and approved.

Under the head of miscellaneous business Dr. Odell moved that Wednesday evening be set apart to receive the paper and stereopticon exhibition by Dr. J. L. Williams, of Section V. Carried.

The regular order was then taken up, and Section VI. being called, Dr. Harlan, the chairman, read a paper, being a continuation of the subject presented by him last year. He also read a brief statement of the properties of eugenol and sanitas. The subject was discussed by Drs. Odell, Bogue, Harlan, Barrett, Atkinson, Shepard, Peirce, Rhein, Field, Allport and Truman, and on motion of Dr. Odell the further discussion was postponed till to-morrow morning.

The Association then adjourned.

SECOND DAY—MORNING SESSION.

The Association met at 10 A. M., the President, Dr. Darby, in the chair.

The minutes of last evening's session were read and approved.

Under the head of miscellaneous business, on motion, the Secretary was authorized to draw the necessary orders on the Treasurer to pay all properly authenticated bills.

The Executive Committee announced the temporary filling of vacancies in that committee by the appointment of Dr. Shepard, of Boston, and Dr. A. O. Hunt, of Iowa City.

On motion of Dr. Dudley the courtesies of the floor were extended to Prof. Mayr, of Springfield, Mass.

On motion of Dr. Lewis, Drs. J. A. Bazin, G. W. Lovejoy, J. H. Bourden, and S. J. Andres, of Montreal, were invited to participate in the discussions.

A telegram was received from Dr. T. T. Moore, of Columbia, S. C., Second Vice-President of the Association, expressing his regret at being unavoidably absent on account of the serious illness of his wife and daughter.

The regular order being resumed, the subject of Dr. Harlan's paper was further discussed by Drs. Searle, Stockton, R. Finley Hunt, Peirce, Watkins, How, Harlan, E. Parmly Brown, Shepard, and Atkinson.

On motion of Dr. Dudley, the subject was passed.

Section VII. being called, the chairman, Dr. Barrett, read a paper entitled Physiology and Etiology. It was discussed by Prof. Mayr, Drs. Atkinson, Spalding, Barrett, and Abbott.

At 1.30 the special order of organization of Sections came up, and resulted as follows:

Section I. Prosthetic Dentistry, Chemistry, and Metallurgy.—John Allen, chairman; W. H. Trueman, secretary; J. G. Ambler, C. S. Stockton, J. A. Robinson, Chas. W. F. Holbrook, W. H. Fundenberg, J. Hayhurst, H. H. Keith, Alonzo Boice, W. B. Ames, W. H. Dorrance, C. H. Harroun, Thos. C. Leiter, M. L. Chaim, J. N. Farrar, C. Bullock, Henry Cowie, W. R. Clifton, C. W. Clement, D. W. Clancey, J. R. Callahan, Chas. E. Dunn, Wm. Dutch, A. F. Emminger, A. W. Freeman, S. A. Freeman, Gale French, David Gibbons, H. H. Jackson, D. J. Pollock, A. T. Smith, S. D. Stewart, W. H. Tillinghast, E. S. Talbot, Sam'l A. White, Geo. H. Wilson.

SECTION II. Dental Education.—A. O. Hunt, chairman; I. P. Wilson, J. N. Crouse, C. N. Peirce, C. H. Osgood, C. D. Cook, E. S. Holmes, Thos. Fillebrown, T. W. Brophy, E. P. Keech, Seneca B. Brown, Jos. Bauer, Ira Brown, Jas. Cleland, A. Colton, J. H. Coyle, S. W. Dennis, Geo. L. Field, J. L. Hill, T. S. Hacker, P. G. C. Hunt, E. D. Swain, J. A. Swasey, W. C. Wendell, C. A. Wingerter, W. H. Morgan.

SECTION III. Dental Literature and Nomenclature.—J. Taft, chairman; W. H. Atkinson, Geo. J. Friedrichs, M. V. Toledo, C. F. Rich, E. A. Bogue, E. H. Allen, C. A. Kingsbury, A. L. Northrop, A. N. Priest, F. H. Rehwinkel, J. H. Smith.

SECTION IV. Operative Dentistry.—L. D. Shepard, chairman; V. H. Jackson, secretary; E. T. Darby, S. C. G. Watkins, W. H. Colgrove, S. H. Guilford, E. S. Gaylord, M. F. Finley, J. C. Walton, S D. Hodge, E. P. Hawes, C. A. Timme, G. W. Keely, C. I. Keely, Jas. McManus, C. W. Meloney, R. C. Brewster, Wm. W. Walker, F. C. Barlow, F. A. Levy, Chas. A. Meeker, W. Pinney, Robt. F. Horne, E. Parmly Brown, G. W. Hoysradt, J. W. Rhone, J. A. Watling, H. B. Noble, Wm. Barker, C. R. Butler, E. Honsinger, J. H. Devore, W. N. Morrison, W. C. Starbuck, S. B. Palmer, S. G. Stevens, W. E. Page, Eugene H. Smith, G. R. Thomas, S. G. Perry, H. J. McKellops, J. B. Coolidge, I. Williams, Frank A. Hunter, A. H. Brockway, Dwight M. Clapp, J. G. W. Werner, E. C. Moore, J. E. Cravens, G. C. Daboll, M. L. Rhein.

SECTION V. Anatomy, Histology, and Microscopy.—C. F. W. Bödecker, chairman; Frank Abbott, secretary; J. L. Williams, F. Y. Clark, G. H. Cushing, Thomas L. Gilmer, T. T. Moore, G. W. McElhaney, Chas. Merritt, B. G. Marcklein.

SECTION VI. Pathology, Therapeutics, and Materia Medica.—A. W. Harlan, chairman; F. M. Odell, secretary; A. M. Dudley, J. Hooper, J. W. Palmer, W. W. Allport, T. A. Wadsworth, M. W. Foster, W. H. Baird, Wilbur F. Litch, R. G. Richter, C. R. Jefferis, C. A. Brackett, J. D. Patterson, F. H. Gardiner, C. P. Pruyn, L. C. Ingersoll, C. S. Beck, A. J. Friedrichs, H. W. Morgan.

SECTION VII. Physiology and Etiology.—H. A. Smith, chairman; N. W. Kingsley, secretary; Denton E. Peterson, W. C. Barrett, J. W. Wassall, R. Finley Hunt, G. F. Waters, Sam'l E. Knowles, G. W. Klump, Jos. Lathrop.

Adjourned to meet at 8 P. M.

SECOND DAY—EVENING SESSION.

The Association met at 8 P. M., President Darby in the chair.

The reading of the minutes was dispensed with until morning, and the Association heard the paper of Dr. Williams, of Section V. After its conclusion Dr. Barrett announced that a serious accident

had happened to the child of Dr. Clifton, of Waco, Texas, and moved that the heartfelt sympathy of this Association be extended to the father. Carried.

Dr. McKellops moved that the Local Committee of Arrangements be instructed to see that every effort be made to bring to justice the author of the above mentioned accident, and that Dr. F. Y. Clark be requested to act in connection with this committee. Carried.

On motion the committee was instructed to secure for the care of the injured child the services of one or more competent nurses.

The regular order being resumed, the discussion of Dr. Williams's paper, Section V., was opened by Dr. Atkinson, when the Association adjourned to meet at 9.30 A. M. to-morrow.

THIRD DAY—MORNING SESSION.

The Association met at 10 A. M., the President, Dr. Darby, in the chair.

The minutes of the morning and evening sessions of yesterday were read and approved.

Under the head of miscellaneous business, the report of the committee on resolutions touching the death of Dr. T. L. Buckingham was presented. It will be found in the memorial pages.

Remarks were made by Drs. Ambler, Stockton, Taft, John Allen, Friedrichs, Shepard, and Searle, and the resolutions were adopted by a rising vote.

Dr. Atkinson read an extract from a letter from Dr. C. F. W Bödecker.

On motion of Dr. Shepard, Dr. F. Y. Clark was by unanimous vote reinstated as a member of the Association.

The Executive Committee made a further partial report on credentials, which was accepted as a report of progress.

On motion of Dr. McKellops, Dr. Crowell, a visitor, was invited to state the views and plans of the Dental Protective Union.

The regular order being resumed, the discussion of Dr. Barrett's paper was continued by Drs. Peirce and Barrett.

On motion, the regular order was suspended to hear from the president of the village, who gave his assurance that every effort should be made by the authorities to bring to justice the author of the accident to Dr. Clifton's child.

The regular order being again resumed, the further discussion of Dr. Barrett's paper was participated in by Drs. Atkinson, Searle, F. Y. Clark, Daboll, Barrett, and R. Finley Hunt.

The subject was then passed.

Section I. being called, Dr. Trueman read its report. This was followed by a paper by Dr. John Allen, and that by another by Dr. J. A. Robinson.

On motion, the subject was passed.

Section II. was then called, and its report was read by the chairman, Dr. C. N. Peirce. Discussed by Drs. Spalding, R. Finley Hunt, Friedrichs, Allport, Cook, and Abbott, when, on motion, the regular order was suspended for two minutes to hear an announcement, after which the regular order was resumed and further discussed by Drs. Rhein and Atkinson.

On motion the discussion was closed.

The resolutions as suggested by Section II. and amended by the Association were then adopted, as follows:

Resolved, That the American Dental Association deems it incumbent upon all well-regulated dental educational institutions to require from candidates for graduation, that they shall have attended two full courses of lectures in reputable dental institutions before being admitted to examination for the degree of Doctor of Dental Surgery.

Resolved, That the American Dental Association deems it incumbent upon the faculties of all reputable dental schools to require from candidates before admitting them to graduation, not only attendance upon the requisite lectures, but a degree of proficiency in the final examination which shall give evidence of professional worth in both the principles and practice of dentistry.

Resolved, That in reiterating these views so often before expressed, this Association is gratified with the action of the National Association of Dental Faculties at its recent meetings as being so much in accord with them.

[This last resolution was offered by Dr. R. Finley Hunt, as an amendment to those presented by the Section, and was accepted.]

Adjourned to meet at 8 p. m.

THIRD DAY—EVENING SESSION.

The Association met at 8.15 P. M., President Darby in the chair. The minutes of the morning session were read and approved.

Under the head of miscellaneous business Dr. Odell, of the committee to look after the interests of Dr. Clifton's child, made a favorable report of the sufferer's condition.

Dr. Taft, of the committee moved by Dr. McKellops on the President's address, made a report which, on motion of Dr. Kingsley, was recommitted, with instructions to report on printed slips at the meeting next year.

The following amendment to the Constitution was then unanimously adopted:

To change the first part of the title of sect. 1, Art. VI., from "Artificial Dentistry" to "Prosthetic Dentistry."

The regular order being resumed, Section III. was called, and the chairman, Dr. Taft, read a partial report, which was discussed by Prof. Mayr.

On motion the chairman of Section III. was instructed to complete the report and place it in the hands of the Publication Committee.

The subject was then passed.

Section IV. was called, and its report was read by the chairman, Dr. E. T. Darby. The subjects were discussed by Drs. Abbott, Allport, Daboll, Watkins, McKellops, Barrett, A. O. Hunt, Barker, F. Y. Clark, and Rhein.

Adjourned to meet at 9 A. M. to-morrow.

FOURTH DAY—MORNING SESSION.

The Association met at 9.30 A. M., the President in the chair.

The minutes of the previous evening's session were read and approved.

The special order, being the selection of the place of next meeting and the election of officers, was then proceeded with.

The following places were nominated:

Asheville, N. C.; Cresson Springs, Pa.; Asbury Park, Detroit, Chicago, Minneapolis, Long Branch, Lake George, and Saratoga.

Minneapolis was finally selected.

The election of officers was then had, resulting in the choice of the following:

President—J. N. Crouse, Chicago.
First Vice-President—M. W. Foster, Baltimore.
Second Vice-President—C. F. Rich, Saratoga.
Recording Secretary—George H. Cushing, Chicago.
Corresponding Secretary—A. W. Harlan, Chicago.
Treasurer—George W. Keely, Oxford, Ohio.
For members of the Executive Committee—L. D. Shepard, C. N. Peirce, and A. O. Hunt.

On motion of Dr. Odell the Treasurer was instructed to honor the draft of Dr. W. R. Clifton, of Waco, Texas, in case of his necessity, to the extent of two hundred and fifty dollars.

Dr. Allport rose to make a personal explanation.

The Executive Committee made their final report on credentials, which was accepted, and the report as a whole was adopted.

The Treasurer made the following report, which was accepted and referred to the Executive Committee for auditing, from whom it was returned approved, and was then adopted:

SARATOGA, N. Y., August 8, 1884.

The Treasurer respectfully submits the following report:

THE AMERICAN DENTAL ASSOCIATION IN ACCOUNT WITH GEO. W. KEELY, TREASURER.

1883.		CR.	
August 10.	By balance on hand		$1,647 70
1884.			
August 8.	" dues received since last meeting		225 00
" "	" " " at this meeting		565 00
			$2,437 70
1884.		DR.	
March 15.	Paid order of Chairman of Publication Committee		$25 00
August 8.	" Secretary's salary		200 00
	" reporter		125 00
	" balance due Publication Committee		3 03
	" Treasurer's salary		100 00
	" " expense—new books, postage, and express-age		19 11
	" M. L. Rhein, of Committee of Arrangements, for use of hall, etc		77 40
	" F. M. Odell, Chairman of Committee of Arrangements, for printing, etc		38 21
	" expense of transferring accounts to new books		25 00
	" for use of table at this meeting		1 00
			613 75
	Balance on hand at this date		1,823 95
			$2,437 70

August 8, 1884. Audited and approved.

J. N. CROUSE,
A. M. DUDLEY, } *Auditing Committee.*

The Executive Committee reported that they had audited the accounts of the Treasurer and Publication Committee and found them correct.

The report was accepted and adopted.

On motion of Dr. Odell the following were adopted:

Resolved, That the thanks of this Association be tendered to Mr. Henry Clair, of the Grand Union Hotel, for his exceedingly generous treatment of our friend and brother, Dr. Clifton, in his present necessity, and also for his liberality in making a reduction to our members in the rates of his hotel.

Resolved, That this Association desires to express its thanks to the various railroad corporations who have favored us by reduced fares, and by other courtesies.

On motion of Dr. Shepard the following was adopted:

Resolved, That the thanks of this Association be tendered to the Local Committee of Arrangements.

The installation of officers was then proceeded with, and the Chair appointed Drs. Peirce and Abbott to conduct the newly-elected President to the chair.

The retiring President introduced him to the Association, and bespoke for him the same forbearance and courteous treatment which had been accorded to himself.

Dr. Crouse upon taking the chair thanked the Association for the honor it had conferred, and pledged himself to preside with impartiality over its deliberations.

A communication was read from the New Jersey State Dental Society touching a petition for the pardon of Dr. Chalfant.

On motion the communication was respectfully returned.

The President appointed on the Publication Committee Dr. A. W. Harlan and Dr. E. T. Darby, and on the Local Committee of Arrangements Drs. A. T. Smith, of Minneapolis, F. H. Gardiner, of Chicago, and H. J. McKellops, of St. Louis.

On motion the subject of operative dentistry was passed.

Section V. being called, was discussed by Drs. Abbott, Peirce, and Spalding.

On motion the Section was passed.

The minutes were then read and approved, and the Association adjourned to meet at Minneapolis on the first Tuesday in August, 1885.

GEORGE H. CUSHING, *Secretary.*

IN MEMORIAM.

THOMAS L. BUCKINGHAM.

WHEREAS, Since the last meeting of this body the all-wise Author of our being has in His inscrutable wisdom taken to Himself our highly-esteemed friend, professional brother, and co-laborer, Dr. Thomas L. Buckingham; and

WHEREAS, Not only this Association but the entire profession of this and other countries will have suffered by this dispensation an irreparable loss; therefore

Resolved, That we deem it fit and proper to give expression to our high appreciation of his personal worth, and of our regret that one who was so essential to the true interests of the profession should have been summoned to higher councils. Yet, while bowing to the will of Him who doeth all things well, we cannot refrain from giving expression to our feelings of sorrow that he should have been removed from among us.

Resolved, That we will treasure his past counsels and profit therefrom.

Resolved, That these resolutions be placed on a memorial page of the proceedings of this body, and copies be sent to the family of deceased and to the dental journals; and that a photograph portrait of the deceased be placed on the Secretary's minutes.

Dr. AMBLER: It has been my pleasure, for the last third of a century, to have been on terms of intimate relationship with Dr. Buckingham, and during that time there was with him one ruling passion, and that was the advancement of his profession. He loved his profession and his professional associates, and was ever ready to do all that he could for both. The entire surroundings of his office, as well as his counsels, were always freely at the disposal of all that would profit by them. It was my pleasure, a few years ago, to be associated with him in some matters connected with an investigation then being conducted, in which personal considerations would naturally protrude themselves; but, said he, "Do not let the personal matter be as your finger's weight in its influence on your consideration of this matter." He was modest and unobtrusive in his opinions; but when they were formed, they were firmly fixed as a rock. He was in all respects a man who commanded our love,

honor, and respect; and now that he has gone we can but mourn his loss. I trust we may all profit by his writings and his life, and so keep alive his memory in our hearts.

Dr. Stockton: There are few men in the dental profession for whom I have a higher respect and deeper love than I had for Dr. Buckingham. It is to him I owe very much of my success as a dentist; for it was by his advice that I was induced to close my office, after some years of practice, and go to the Pennsylvania college. It was the wisest and best thing I ever did in my professional life. Dr. Buckingham was ever a kind counsellor and good friend; he was almost a father to me, and I could only wish that I might hold as high and estimable a position in the hearts of my friends as Dr. Buckingham does in his. I wish I might go to the end of my professional life as he did,—you remember how he came here last year, with tottering steps and feeble form, to close his existence as honorably and usefully as he had ever lived. I support with heartfelt sympathy the resolutions which have been offered.

Dr. Taft: No one knew Prof. Buckingham but to entertain for him a high regard. I suppose there is scarcely a man in the profession—and no one especially who has been in such a position as he has occupied for a quarter of a century—who has maintained his standing better in the estimation of his fellows than Dr. Buckingham. The high esteem which each one entertains for him will find a response in the minds of all with whom he may speak about him. This is true of Dr. Buckingham to a greater extent than of perhaps any other man in the profession whom I now call to mind. What he did for the profession was done with a sincere, earnest desire for the best results. He maintained an enthusiasm in the work which had occupied his professional life—namely, that of education—up to the end of his career, an enthusiasm that it seems to me has been unparalleled. At the last interview I had with him he seemed as earnest and as intensely interested in the subject of education as he did in the years gone by. Even when he was laboring under the disability of disease, and well-nigh broken down, under circumstances which would make the rest of us forget these things, they were upon his mind, and interested him as they had always done.

What he has done for the profession is incalculable. I wish I could feel that the work I have done was as out-reaching as that which he has accomplished for the profession, and that we all might have an ambition to serve our profession as he had.

In attempting to frame those resolutions, I felt how utterly unable we were to say anything that was at all comparable to that which ought to be said for this man; but I know that in the heart of every one here there will be a free response to what has been said; and the shortcomings of the resolutions will be supplemented in the esteem and high regard which are entertained for our friend by every one who knew him, as well as by others who shall hear of him.

Dr. ALLEN: Having been acquainted with Dr. Buckingham for many years, and having met him under various circumstances, I most heartily indorse all that has been said with reference to him on this occasion; and I hope that we shall ever cherish in our hearts a fond remembrance of that noble man.

Dr. FRIEDRICHS: As I am from the other extreme of our common country,—from the South,—I think it is my duty to add a few words in memory of our honored fellow and brother, and to express the sense of loss that we must all feel at his departure from us. Dr. Buckingham's reputation was not a local one. He was loved and esteemed from one end of this country to the other.

Dr. SHEPARD: As coming from the other extreme from that of the last speaker, I feel that it is a privilege to bear witness to the estimation in which our friend was held in the Eastern section of the country, and also to express for myself the respect and admiration which I always felt for him, as a sturdy, upright, true man and good friend. It is personally a matter of regret to me that I did not see him last year. He was one of the few of the older members—so much older than myself that it actually used to seem disrespectful at first—whom, when we met at our annual meetings, I would take by the hand and call by his first name. He would tap me on the shoulder and say, "That sounds real nice." Such was our pleasant relationship that it is a particular sorrow to me that we shall see him no more among us.

Dr. SEARLE: I want simply to express my feeling of personal loss in the death of Dr. Buckingham. I thought when I heard of his death that one of the most loved members of our profession had left us. I know of no one, much as I love and respect the dentists of Philadelphia, to whom I would sooner pay my respects when I visited the city than to Dr. Buckingham. My feelings have been well voiced by those who have spoken before me, and I could say no more if I should speak at greater length.

Annual Address.

By E. T. DARBY, President.

Gentlemen of the American Dental Association:

A quarter of a century ago a company of representative American dentists, duly appointed by local societies, assembled at the Falls of Niagara to consider the desirability of organizing a national dental association. That Association was formally organized the following year in the City of Washington, and it has held, with the exception of a single year, annual meetings until the present time.

It was named the American Dental Association. The object was, "to cultivate the science and art of dentistry and its collateral branches, to elevate and sustain the professional character of dentists, to promote among them mutual improvement, social intercourse and good feeling, and collectively to represent and have cognizance of the common interests of the dental profession."

Of its original members a few remain until the present time, honorable representatives of their local societies, faithful to the Association which they helped to organize, regular in attendance at its annual meetings, and taking an active interest in all that pertains to its well-being. Others, by reason of advancing years and physical infirmities, are prevented from attending these annual gatherings; and others still, both in the prime of life and at the allotted period of man, have finished their work on earth, and have passed through the narrow portal which separates the things seen from the things eternal. Hardly a year passes that we are not called upon to record the death of one or more of our members. To-day it becomes my sad duty to make public announcement of the removal of another.

All who were present a year ago will remember the feeble health and the tottering step of our departed friend and co-laborer, Dr. T. L. Buckingham, and I am sure this Association will take mournful pleasure in making suitable record of his worth. Dr. Buckingham

was one of the original members of this Association, and from its organization to the time of his death was rarely absent from its annual sessions. Affectionate in disposition, genial and generous in his intercourse with others, modest of his attainments, and yet earnest in his opinions, he was one whom we honored as a dentist and loved as a man.

To those of you who have survived the "shocks of time" these twenty-five years have seemed to pass with lightning-like rapidity, and you are prepared to say, with the ancient Judean king, "My days fly swifter than a weaver's shuttle." To others of us who cannot claim so many years of active service, some of these are but as years of recorded history. As travelers on the busy highway of life, it is sometimes profitable for us to loiter for a moment and count the milestones that we have passed, and review the progress that has been made.

What stupendous events have transpired since this Association was organized!—events affecting us as a nation, as a profession, and as an association. Almost a generation has passed away; the infant child has become the stalwart man. The population of the United States has increased from thirty to fifty-seven millions. A terrible civil war has been fought, and enemies have become friends. The Atlantic cable has been laid, and the electric spark is darting from continent to continent. The Pacific Railroad has been built, and the locomotive whistles from Maine to the Golden Gate. Our country has celebrated its National Centennial, and we are elated with laudable pride because we have been honored by all the nations of the earth. The electric light, and telephone, and phonograph have been introduced, and the arts and sciences are proclaiming each day new discoveries. Colossal strides have been made in the matter of education. Our colleges and public schools have nearly doubled. Woman has been emancipated and her social status transformed, and new avenues to usefulness and eminence opened to her.

Nor have the changes in our profession been less great. Look for a moment at its growth. In 1859 there were less than four thousand practicing dentists in the United States. Now there are more than twelve thousand. Then there were less than twenty dental societies; now there are one hundred. Then there were but three dental colleges in America; now there are twenty, including universities which have dental departments. Then not a single State had laws regulating the practice of dentistry; now no less than twenty have legislative enactments, with penalties attached

for their violation. Then the literature of the profession consisted of a few text-books upon dental subjects, one or two monthly or quarterly journals, and the occasional published proceedings of a few dental societies. Now we have a creditable number of works upon dental subjects; no less than twenty periodicals, of which twelve are monthlies, seven quarterlies, and one annual; and in addition thereto, the published proceedings of several State societies, which constitute, not infreqently, the most valuable additions to our literature.

Such, in briefest outlines, has been the numerical growth of our profession. But numerical growth is not always progress. It has been thought by many that the rapid increase in the dental profession has been a detriment rather than a blessing to the public, and complaint has often been made that the dental schools have increased too rapidly, and the number of graduates sent out therefrom has been greater than the demand for them. This rapid increase in the number of schools shows, at least, an interest in the matter of dental education; but, while schools are organized and conducted as they are, there is one serious objection to further increase, namely, the want of adequate support. So long as dental colleges are dependent upon the fees of students for their support, so long will there be a tendency to increase the number of matriculates, irrespective of the qualifications of the men who apply. The only proper way to determine this matter of fitness would be by a rigid, uniform, and systematic preliminary examination, and even then the difficulty would not be entirely overcome, for the reason that examinations do not and cannot well embrace all the qualifications constituting fitness for entrance upon the study or practice of dentistry. The candidate for entrance upon a course of dental education may be intellectually endowed, and yet be wholly wanting in those mechanical qualifications which are so essential to a successful practitioner. Dentists, like artists and poets, are born, not made.

What the dental schools of America most need is endowments adequate to their support, rendering it possible for the professors and teachers in such schools to give their entire time and energies to the thorough instruction of the students in attendance; but it is hardly to be expected that such a happy condition of things will be brought to pass in the near future. Would it not be better, then, to have fewer schools, larger attendance upon each, and better facilities for instruction?

If the dentists of America would contribute five dollars each per

annum for five consecutive years, a fund could be raised sufficient to erect suitable college buildings, leaving enough for the endowment of five professorships, and, with the help of the fees received from students, make an income sufficient to enable each professor to devote his entire time to instruction. Such a school, or a number of such schools, located in the larger cities of our country, where the supply of clinical material is practically inexhaustible, governed and controlled by a board of trustees selected from among honorable men in the profession, or perhaps appointed by State societies, would certainly command the confidence and respect of the profession.

The tendency at present seems to be the establishment of dental departments in connection with universities or medical schools, and where such institutions are located in or adjacent to large cities, from which to draw a large clinical supply, and where the parent school is able to bear a large share of the expense and contribute to the facilities for instruction, such a union seems to promise well; but such a wedlock demands a thorough appreciation of the relationship which dentistry sustains to general medicine, and is based upon the belief that dentistry is a specialty of medicine. If this be true, it seems to me that at no distant day such schools should demand the same qualifications which entitle the candidate for graduation to the single degree of medical doctor; not that such qualifications are absolutely essential to the intelligent practice of the dental specialty, but because of the increased culture which such a course would afford.

The dental schools of America have just cause for pride when they survey the immense strides they have made during the past quarter of a century, and it is but just that we, ever and anon, make public mention of the valuable service which has been rendered to the cause of dental education by many connected with these schools. From the first, and even until the present day, their work has been largely a labor of love, without adequate compensation for the time spent in teaching, and, often with *no* pecuniary reward, they have labored on, and frequently contributed from their own scanty income to meet the expenses which they assumed in the management of the school.

While this Association has been quick to recognize any apparent shortcoming on the part of those engaged in college work, it has not always been as ready to speak encouraging words to the pioneers of dental education, and some have gone to their graves feeling that

they were doing a thankless work. It must, however, be said to the credit of this Association that it has from the first encouraged greater requirements on the part of the colleges, and has adopted resolutions making it obligatory as a condition of representation here that all schools shall demand, as one condition of graduation, attendance upon two full courses of lectures.

It is a pleasing augury for the future that a meeting of the faculties of the various dental schools has been called to fix upon a uniform standard of graduation; and it is to be hoped that within another year the candidate for a dental degree must have spent at least two years, or attended upon two full courses of five or more months each, in a reputable dental school, before being eligible to graduation.

Another cause for congratulation, and one indicative of real progress, is to be found in the fact that so many States have enacted laws regulating the practice of dentistry within their borders. The law is primarily to protect the public, and as most of them are framed will accomplish this object; but it does more,—it provides that State societies shall appoint boards of examiners, who are, in a certain sense, dictators. These boards not only have the power to decide whether non-graduates are competent to practice, but one of them at least, in the State of New York, ventures to say whether the graduates of certain colleges shall be allowed to practice within their commonwealth. And this is as it should be. If dental schools are lax in their requirements, and men seek such schools because of their disregard of requisite fitness, and graduate therefrom, the State should step in, and through its examiners and censors compel such men to give evidence of their qualifications before entering upon the practice of their specialty. In order to be efficient, however, these examining boards should be as thorough in their examinations and as rigid in their requirements as are the faculties of dental schools; otherwise the certificates from the examining boards will be often sought instead of a well-earned diploma from a reputable school. So far as we have any personal knowledge in the matter, the examinations of the various boards have been all that could be desired in this direction, and the testimony of some who have tried both has been that they are alike rigid. It does not seem right, however, that examining boards should have the power by sanction of the State to grant degrees, for, by so doing, it is putting itself in competition with dental colleges, and yet condemns these very colleges for granting diplomas without previous attendance upon the curriculum prescribed.

Another evidence of our progress is to be found in the improved character of our literature. It was formerly said that all of the original scientific work of the profession was done by our friends on the other side of the Atlantic, and that the American dentists were celebrated only for their manipulative skill and mechanical appliances. While such a statement would have contained much of truth in it a quarter of a century ago, it cannot be said of the profession in America at the present time.

The scientific work that has been done by American dentists during the past decade will compare favorably with that done by any other class of professional men, either in this country or Europe. One has but to read the original articles in our dental journals and the papers contained in the proceedings in our State and local societies, and of this Association as well, to be convinced of the truth of that assertion. Were it not for the bread-and-butter side of life, and the mad rush to become rich which in such a remarkable degree characterizes the American mind, our own profession would come to the front with greater evidence of the attainments which lie dormant within it. It is not so much the capacity to do scientific work which we need in America as it is the time to do it thoroughly.

The editors of dental journals complain that it is with the greatest difficulty that they can procure original articles for their magazines, and they are frequently compelled to publish inferior papers because the men who are competent cannot find time to devote to literary or scientific work. Notwithstanding this, our journals show from year to year marked improvement, and new text-books are frequently being added to our list of publications.

Our progress in every direction during the past quarter of a century is proverbial, and American dentistry, because of its excellence, is known wherever civilization is to be found.

But what relation has this Association sustained to the dental profession during the period of its existence? It was organized for an object, and that object is set forth in article second of our constitution. It was intended to be national in character, embracing in its membership worthy representatives from all sections of our country. In its earlier years political differences prevented the coöperation of the dental profession residing in the South, and although these barriers which once existed have been nearly or quite removed, we have never had the sympathy and support which would have been so agreeable from the Southern States.

While the growth of the Association has been gradual, the attend-

ance of its members has been fickle. It is with regret that we are compelled to say it has not received at all times that support and encouragement which it has deserved. Why that sympathy and support have been withheld it would be difficult to tell. Its aim has been to advance the interests of the profession in every possible way, and the work which it has accomplished has been such as to command the respect of all. In seeking for a cause of this dearth of interest we naturally turn first to its organization, but a careful scrutiny of its constitution fails to reveal any apparent defect. Its condition of membership is certainly not unreasonable. It has ever manifested the most liberal spirit, and has received into membership all worthy delegates from local societies. Nor has it been intentionally lax in its requirements. Occupying, as it has, the most critical place in the profession, it has endeavored to maintain a dignified and honorable attitude with relation to other societies. Fault has sometimes been found with its plan of membership, some contending that an association seeking to be national in character, and made up of delegates from State and local societies, ought not to have a permanent membership, but should be simply a delegated body, changing from year to year, as these societies may elect. Whether such a plan would work better than the one now in existence could only be determined by experiment. Complaint has also been made that our present methods are faulty, and that the Association cannot accomplish its maximum of good until others are adopted. Most present are probably aware that prior to 1879 the work of the Association was under the management of standing committees, and, while these seemed to accomplish much, there was an earnest desire on the part of some that a new method should be adopted. Accordingly, the plan in vogue in the American Medical Association was suggested. The permanent membership of the Association was divided into Sections, comprising seven, each having its chairman or head, and the work of the Society was to be done under these seven Sections. While many of the older members were in favor of this change, there were others who opposed it, and only consented to it with the understanding that it was to be an experiment, and that, if not satisfactory in its results, there should be a return to standing committees. Perhaps it is yet too soon to express a positive opinion as to the wisdom of this change, but your President is not alone in the belief that the Association has not accomplished as much under its present system as it did under the old one of standing committees.

Perhaps there are other reasons than the one just mentioned why

the Association has not been as successful in its work as could be desired, and were your President asked to indicate some of the causes of failure, he would ascribe it primarily to the profession at large. While there is a fair percentage of representative men who are constant in their attendance and faithful in the discharge of their duty, there is still a larger percentage who attend but seldom and who seem to take no active interest in the work of the Association. This latter class constitutes the complaining element which is so damaging in its influence. They will not work themselves, but are ever ready to criticise disparagingly the actions of others. It might justly be denominated the "dog in the manger" element. There is still another class who seem to take a semi-interest in the Association. They allow themselves to be appointed as delegates by their local societies; they come late, attend a few of the sessions, and take their departure early. How frequently it has happened that the sessions of the last day have been rendered unprofitable because of the absence of the majority of the members. It has been urged by some that our time for meeting is unfavorable; that we convene at a season of the year when our physical and mental energies are at the lowest ebb, and that, were we to hold our meetings at another season of the year, the attendance would be larger and the activity greater. The difficulties attending a change of this kind are of such a serious nature that few, I think, would be in favor of it. Men who are engaged in active practice cannot well leave their homes at other seasons of the year, and, although cooler weather might be conducive to greater mental vigor, the danger is that our attendance would diminish rather than increase.

Gentlemen of the American Dental Association, permit me to say in conclusion, and with none other than the kindest motives, that the needs of this Association can be embraced in one comprehensive maxim,—more honest work; less carping criticism.

SECTION VI.

Pathology, Therapeutics, and Materia Medica.

Supplemental Report on Treatment of Pyorrhœa Alveolaris, with Notes on Eugenol and Sanitas Oil.

By A. W. HARLAN, Chairman.

NUMEROUS letters of inquiry asking for more specific details of the treatment of pyorrhœa have shown the widespread interest in this subject which has been awakened by recent contributions to dental literature. These evidences of a desire to accomplish all that is possible by any method of treatment advocated have induced me to continue my labors in this direction. The experimenter must have a genuine enthusiasm, combined with patience and intelligence. The reawakened activity in seeking to restore loose teeth to firmness in their sockets has shown that a new method of treatment was eagerly sought after to control the ravages of the disease under discussion. The writer is gratified to know that his efforts in the past have been so spontaneously recognized, and he here desires to express his acknowledgments for the words of encouragement so freely conveyed.

The mass of the profession are so likely to confound with pyorrhœa alveolaris salivary deposits on the lower incisors, or such deposits on the buccal, palatal, or lingual surfaces of molars, that it seems necessary to restate the fact—apparent to all close observers—that salivary concretions are only in slight degree, strictly interpreted, the cause of or associated with pyorrhœa, except as shall be hereafter alluded to. In many incipient cases a careful examination discloses the fact that there is only a slight recession of the gums surrounding the necks of affected teeth; in others none at all. In those cases recognized to be of longer standing may be observed a blunting of the septum of gum lying between the teeth, with a tendency on its part

to bleed on slight provocation, especially between the molars and bicuspids. In all cases where the discharge of pus is abundant on pressure being applied, the loss is observed of more or less of the bony process surrounding the root of the tooth, its symmetrical outline disappearing irregularly. This accounts for the varying depth of the pockets. Where the process is thinnest normally there will be found the most extensive destruction of bone.

Pyorrhœa alveolaris is not a disease of old age any more than it is a disease of youth or middle age. I have seen it in at least one case as early as the ninth year, and several times before the sixteenth year. From the number of cases of true pyorrhœa recognized up to this time I am unable to say at what period of life it is most frequently observed. My personal experience leads me to think that more cases are to be found between the ages of twenty-five and forty-five, but I have no reliable data to establish this. The thoughtless and ignorant extraction of teeth by those not competent to observe, neglect to consult a dentist at the proper time, failure to impress those persons suffering with pyorrhœa by the dentist into whose hands they intrust themselves, lack of means to secure proper attention at the right moment, and other causes not necessary to enumerate, all tend to prevent even an approach to the truth. It is to the future that we must look for statistics of age, sex, and the condition of the general health, the teeth most likely to be affected, etc. Pulpless teeth, even in the few cases I have seen, do not escape its ravages. Users of tobacco are not less liable to suffer than those who do not habitually use it. The worst cases I have seen were those where tobacco had never been used. Long-crowned teeth, slender teeth, teeth with small necks, and teeth which have been separated by files and disks and not properly cared for afterwards, teeth pretty generally free from extensive caries, teeth of mouth-breathers, are the ones most liable to be affected by pyorrhœa. Teeth which have lost their antagonists early are not often affected. After the inception of the disease teeth which are normally even and regular in their appearance change position, become twisted in their sockets, spread laterally, protrude over the lower lip (the central and lateral incisors) and if a tooth should be extracted through thoughtlessness or ignorance, the contour of the mouth may be changed. The teeth may even overlap each other, or a tooth may be pushed out of line. It is not possible without taking too much space to say how many deviations of position have been observed.

The fact cannot be too strongly reiterated that the vast majority

of cases of pyorrhœa are seen uncomplicated with salivary deposits. The writer is supported in this view by such observers as Black, Ingersoll, Witzel, Walker, and others who are well recognized as authorities. I have seen, in a number of cases, salivary deposits on the inferior incisors and on the buccal surfaces of superior molars, yet the remaining teeth were found free from such incrustations and still the patient suffered from true pyorrhœa. Several cases have shown a tendency to the deposition of salivary calculus on certain teeth while undergoing treatment. The dentist not in search of these cases will frequently be deceived by the appearance of the gums, as not many cases present an inflamed or thickened margin; few cases are to be seen where the *ligamentum dentium* has completely lost its hold on the neck of the tooth, and fewer still where the gums present a pale, flabby appearance. Many cases are seen where the gum has a purplish color, of various shades, corresponding to the outline of the pocket beneath. Pockets may be seen on the labial surfaces of the anterior teeth before the destruction of the alveoli has begun. This statement is based on the examination of cases known to be in their incipiency. The writer, having no desire to unnecessarily lengthen this paper, refers his interested readers to the undermentioned papers for various conflicting views on the pathology of pyorrhœa.*

I do not pretend to discuss the causes of pyorrhœa at this time. Later I may have something to communicate on that subject.

Treatment.

Instruments. Experience has shown the necessity for possessing three probes of extreme delicacy for examining the pockets: first, for their depth and width; second, for detecting serumal deposits on the roots, and third, to discover the condition of the edges of the alveoli. The probes should be smooth-pointed, so as to not lacerate or wound the gums. Previous to using them the mouth should be thoroughly cleansed by syringing it with tepid water, and the gums dried with bits of paper, fibre lint, or spunk. When the condition

* L. C. Ingersoll, "Alveolar Ulceration," Transactions Ill. State Dental Society, 1880. G. V. Black, "Phagedæna Pericementitis," 1882. A. Witzel, "Infectious Alveolitis," *Brit. Jour. Dent. Science*, Feb., March, 1882. J. Arkövy, J. Iszlai, J. Walker, W. H. Atkinson, Vol. III., Transactions International Medical Congress, London, 1881. A. W. Harlan, *Dental Cosmos*, October, 1883. G. A. Mills, *Dental Cosmos*, 1879, *et seq.*, *Missouri Dental Journal*, 1882 or 1883, and others of a more or less fragmentary nature.

of the gums, roots, and alveoli has been ascertained, the plan of procedure must be determined. When there are salivary deposits they are to be removed at the first sitting, and the patient furnished with:

℞.—Pinus canadensis (white), ℥ ss.
Aquæ rosæ, ℥ iijss.
Eugenol, ♏ xxx.
M.

Sig. Use thrice daily for six days on a badger tooth-brush.

If there are more than four teeth affected I do not as a rule attempt to remove the serumal deposits (if such are present) from all at the first sitting, but reserve them for the second appointment, which must be made on the fourth succeeding day. Then include the four following, and so continue until the whole number have been thoroughly treated.

The instruments for the removal of serumal deposits which please me best are known as Cushing's scalers (made by The S. S. White Dental Manufacturing Co.). I have added to my set several others, so that with ten or twelve instruments—all necessitating a *pushing* motion—I am well equipped for the removal of any deposit on the root of a tooth, or in the bifurcation of a root. In addition to the above, two or three small spoon excavators are necessary for scraping and excising the edges of the alveoli, when it is not possible to accurately bur the edges with an instrument run by the dental engine. Where the teeth are widely separated, instruments of grosser calibre may be used. An ordinary hypodermic syringe with any approved point is also necessary. There should be points of at least three differing angles, in addition to one straight one; these points should not be too sharp. I use one syringe for injecting H_2O_2 *exclusively*. Two syringes are all that any one needs. The pockets are injected with H_2O_2 immediately following the removal of the deposits and the excision of the edges of the process. Any guaranteed peroxide of hydrogen may be used. It should be kept in a cool, dark place, in a glass-stoppered bottle which has been covered with a dark-blue paper. One ounce is all that is necessary to keep in the case for daily use. Immediately following the injection of H_2O_2, I use almost exclusively iodide of zinc in solution of water—from three to forty-eight grains to the ounce,—beginning with the stronger solutions in the worst cases by injecting two to four drops in each pocket, and gradually decreasing the strength until the cessation of treatment. I have been using eugenol and sani-

tas oil, much diluted with oil of wintergreen or sassafras, in place of ZnI_2, but I am not yet ready to report on their effectiveness.

I direct the patient to refrain from brushing the gums with a stiff brush and from fingering or squeezing them during treatment. I discontinue the use of the Pinus canadensis prescription when I begin the treatment of the pockets. Loose teeth are wired together with fine binding wire (tinned); or silver, platinum, or gold wire may be used. The patient in the beginning is required to appear once in four days. When constitutional treatment is called for, which is seldom necessary, the patient is placed under such appropriate treatment as the case demands. The injection of H_2O_2 is discontinued when suppuration has ceased. I frequently prescribe for use at this time a dentifrice in the form of a paste, as follows:

℞.—Precip. chalk,
Powd. orris root, aa, ʒ ii.
White castile soap,
Powd. borax, aa, ʒ ss.
" myrrh, ʒ ii.
Honey and glycerin, q. s. to make a soft paste.
Color rose pink.
Perfume to suit.

To be used before retiring and after breakfast on a brush not dipped in water and not too stiff.

If desired or needed I add to the prescription twenty drops of eugenol. Generally this will be found a desirable addition. After the fourth or fifth visit the interval between appointments may be lengthened to a week, then to ten days, and finally to two weeks.

As elsewhere stated,* I have found that, in all acute cases of pyorrhœa associated with pain, iodoform made into a paste by adding oil of cinnamon or eugenol until of the consistence of thick cream is an excellent anæsthetic. It is used by packing the paste into the pockets, directing the patient to return in three or four days. I have had equally good results in painful cases from the injection of weak solutions of chloride of aluminium, one to three grains to the ounce of water. As soon as the inflammation has subsided these are to be discontinued.

I have no doubt that there are other equally useful remedies in this stage of pyorrhœa (iodo-chloride of zinc, chinoline tartrate, saturated solution of iodine in wood creasote, iodoform and eucalyptus, dilute alcoholic solution of menthol, etc.). However, from

* *Dental Cosmos*, October, 1883, page 517.

a long and persistent use of the medicaments first mentioned, up to date I give them the preference. During the period of consecutive treatment of these cases the patient must keep the mouth scrupulously clean and pay attention to correct rules of hygiene.

The practitioner who desires to succeed in curing pyorrhœa must be a heroic surgeon, and a faithful therapeutist. Lacking enthusiasm, not doing faithful work, or neglecting to impress the patient with the necessity for strictly following his directions, he must fail; but believing in the treatment he proposes, fully conscious of its importance, and patiently proceeding in the face of all obstacles, neglecting nothing essential, success will crown his efforts.

Eugenol and Sanitas Oil.

By request of Section VI. the chairman was deputed to present a brief statement of the properties and uses of eugenol and sanitas oil.

Eugenol is one of the active principles of oleum caryophylli, and is known in the Dispensatories and by chemists as eugenic acid. It is prepared by decomposing eugenate of potassium with sulphuric acid, and is afterwards rectified, when a colorless oil of the specific gravity of 1.076 is obtained. It has an odor of oil of cloves intensified, and possesses a sharp and penetrating taste. The chemical composition is $C_{10}H_{12}O_2$. It is not decomposed at ordinary temperatures, and has no tendency to become thickened by exposure to the air, or to precipitate a sediment. It may be diluted with water—which is preferable—or with alcohol. Its potency as a parasiticide is retained best in aqueous solution.

The dental uses of eugenol so far have been limited. When applied to an exposed or nearly exposed pulp the pain from exposure is greatly lessened and frequently ceases altogether after a minute or two. If the cavity has been washed with a solution of sodæ biboras previous to its application, it is probably the best dressing for a slightly inflamed or congested pulp that we possess, not excepting the various iodoform pastes. It may be injected through a fistulous tract and the root sealed at the apex immediately in all alveolar abscesses of recent occurrence, no further treatment being necessary; but it is imperative that the root should be thoroughly filled. I have injected two drops into the interior of an epulis and in three weeks the epulis had disappeared. As a dressing for root-canals after the removal of a recently destroyed pulp, it will and should supersede all of the powerful coagulators of albumen. Diluted with water—1 part of eugenol to 1000—it is an elegant and agreeable dressing in-

jected into the pockets of pyorrhœa, and may be substituted in that proportion for H_2O_2 in cleansing the pockets. With proper precaution it may be injected full strength into a blind abscess after it has been cleansed by using H_2O_2. In such cases the root-canal should be sealed loosely with cotton saturated with it. Other uses of eugenol will suggest themselves to those who are engaged in experimental therapeutics.

Eugenol in full strength will coagulate albumen. It is a powerful germicide, and not dangerous to human life, as the ordinary dose is much larger than would be used in treating a dozen abscesses at one sitting.

Sanitas oil is obtained by the oxidation of oil of turpentine floating on water by directing a stream of heated air on its surface. It contains camphoric acid and peroxide of hydrogen. The oil possesses oxidizing powers equal to a ten-volume solution of H_2O_2 and may be considered to be a convenient method of storing H_2O_2, as we have in this product a germicide of the first rank combined with a volatile oily dressing, which is disinfectant, antiseptic, and not poisonous. It is non-irritating and has an odor similar to fresh pine, which is not disagreeable. The odor may be disguised by adding the oil of either gaultheria, cinnamon, or sassafras. Eugenol or eucalyptus will not disguise the odor except in larger volume than the sanitas.

It has been used to inject pyorrhœa pockets; in the treatment of alveolar abscesses,—non-fistulous,—and as an ingredient of mouth-washes; for dressing foul ulcers, wounds, ulcerated sore throat, and as a dressing over exposed pulps, and for injection into abscessed antra. It is soluble in alcohol and ether, and some of the essential oils,—not readily so in the latter. My use of it has been confined to sixteen cases of various forms of alveolar abscess—so far with success,—and semi-occasional use of it in the above-mentioned list of diseases.

Both eugenol and sanitas may be procured in this country—Schuchardt's and Merck's eugenols are reliable, and sanitas is manufactured by the Sanitas Co., of London, England. Sargent of Chicago imports both preparations.

DISCUSSIONS.

Dr. Odell: I wish to express my high appreciation of the paper which Dr. Harlan has just read. There is only one point where I

would take any exception to it. The doctor seems rather to disapprove of manipulation of the gums in the cases he has mentioned, and is in favor of letting the drugs do the whole business. I have had two cases myself, and quite important cases, too, and have participated in attendance upon one which Drs. Rhein and Bödecker had in charge, where the manipulation of the gum at a certain stage seemed to be about the only thing that kept up the reparative action. At least, until that was done there was very little progress toward recovery. We had in one case a molar that semi-occasionally resisted treatment, or seemed to get just about well, and then suddenly everything would break loose, and you could readily pass the probe quite to the apex of the root. Finally, we decided upon having the patient assist in the treatment by frequent manipulation of the gum. That was supplemented by the application of the galvanic current once in four days, and then the parts got well. All the drugs that we applied, however severe or however mild, did not seem to have the desired effect upon that particular locality. The conclusion that we came to was that it was a sort of neurosis, and that electrical treatment would be the thing to help us out of the difficulty. Some experiments are now in progress by Dr. Bödecker looking to the establishment of that position. I will not attempt to give a synopsis of the theory, but will simply say that it seems to me so reasonable that I am satisfied to wait until Dr. Bödecker and the gentleman engaged with him finish their experiments and present it in their own manner.

Dr. Bogue: I would like to ask Dr. Harlan, if it is in order, why, at a certain stage of his treatment, he recommends the use of Canada balsam? and, also, why, at a certain stage, he recommends powdered myrrh? The questions seem to me important.

Dr. Harlan: In answer to Dr. Bogue's question, I would state that I said in the paper that the prescription was made for the purpose of washing the mouth and gums after removing the salivary deposits, and was discontinued when the systemic treatment of pyorrhœa proper was begun; so it was not used in the treatment of pyorrhœa at all. That much with reference to Canada balsam. With reference to the myrrh in the paste, the quantity is so small that I presume it might be left out. Perhaps there was no particular benefit to be derived from it, but it disguised the taste of some other things,—borax, for instance,—that would be disagreeable to some people. The chief object was to make it a paste instead of a powder, as I have found that in that form it was less liable to lodge

around the necks of the teeth, and that the patient would wash his mouth and teeth more thoroughly.

Dr. Bogue: It has seemed to me that if, in these cases, it is necessary so carefully to remove all deposits from the roots of the teeth before commencing either constitutional or active local treatment, it is entirely unphilosophical to use, among other agents, those that must in the very nature of the case produce deposits. The substances mentioned are precipitated by water, and the effect of them must be to render the teeth sticky by just so much as they are used, if my understanding of the matter is correct. Perhaps I am in error in supposing that there is a discrepancy between the doctor's statement and his practice, and if so, I would be very happy to be corrected. I have noticed for many years that gentlemen of our profession have a tendency to prescribe tincture of myrrh and such things, which I could never understand the use of.

I wish to express my profound thanks to Dr. Harlan for his admirable paper, for his researches in this matter have certainly been of benefit to me, and I believe also to others.

Dr. Harlan: I would like to ask Dr. Bogue if he ever used a tooth-paste in which there was a small proportion of myrrh.

Dr. Bogue: Not consciously; I use glycerin instead.

Dr. Harlan: I have used this paste myself, and have not been conscious of any deposit of myrrh on my gums; at least, none which would remain. I think with a paste the patient is much more likely to brush and rebrush his teeth than with a powder. Patients tell me so, and I believe it to be true. I have seen several hundred cases of this kind, and if myrrh is not a good thing to put in this paste, I certainly wish to take it out. I have not studied the action of myrrh very closely, and don't know much about it. I supposed, however, that it acted in the nature of an astringent.

The President: I am sure this is a very interesting question, and I hope it will be thoroughly discussed.

Dr. Barrett: With the exception of dental caries, I suppose there are none of the oral diseases which the dentist is or should be called upon more frequently to treat than this disease of pyorrhœa alveolaris. I have listened with interest to what Dr. Harlan has said on this subject, and I have read with interest what he has written. I am expectantly awaiting the presentation of his promised paper upon the etiology of this disease. Until we understand the causes which produce it, we shall not be prepared to enter upon an intelligent course of treatment. What are the pathology and

therapeusis of this disease? Is it an affection of the peridental membrane? Is it a disease of the soft tissues, or is its seat in the osseous structures? Is it local or constitutional? Is it curable or incurable? Does it demand surgical or merely medicinal treatment? If it be confined to the peridental membrane, one course of treatment will be indicated. If it be something entirely dependent upon the superficial deposits upon the tooth, then a different treatment may be called for. The cases which have afforded me the greatest anxiety have been those in which there was certainly an affection of the alveolar process, if indeed such is not the fact in all cases. I have found in these instances that a simple removal of superficial deposits, and the application of astringents, cauterants, or any other class of remedies, was not sufficient. It did not reach the foundation of the disease. I have had some cases that have seemed to be extremely obstinate. In one of these I performed frequent operations, until I feared I must remove all the alveolar wall before I succeeded in arresting the course of the disease. My own treatment has been, in all obstinate cases, the removal of the edge of the alveolar process, because I believe the disease in such cases to consist mainly of caries of the border of the process. It might be termed alveolar necrosis, but for the fact that there is no regular sequestrum formed, although there is a wasting of the alveolar walls. Is that owing to peridental inflammation, or is it due to a disease in the bone—in the alveolar walls themselves? My own experience teaches me that in all serious cases the alveolar walls are materially affected, and that, until you have removed the carious portion and established a line of demarkation between the healthy and the diseased bone, no progress can be made in the treatment. When that has been done, and the superficial deposits have been removed, I have had no trouble, and all after-treatment has been simply incidental and palliative. Of course, I do not mean that I can cure every case that comes into my hands, but in the cases where I have been most successful I have noticed what I have stated.

To set up this line of demarkation, the agent that has proved most efficacious in my own hands has been chloride of zinc. I have used the iodide of zinc with happy effects, but the chloride is more satisfactory. We all know that there is scarcely anything in the range of our materia medica which so stimulates the production of new tissue. My main dependence, therefore, after the use of aromatic sulphuric acid, or something of that kind, has been chloride of zinc, simply as a stimulant to the formation of new bone.

Dr. Atkinson: In what strength?

Dr. Barrett: All strengths,—whatever the case in hand seems to require. I have used it in degrees varying from a saturated solution down to an extreme attenuation. The intelligent physician will adapt his remedy to the condition of the case. If it be a case where I desire a sloughing of the soft tissues or a complete breaking-down of certain elements, I inject a forty or sixty per cent. solution. It is only the personal experience of the individual which can guide in such cases.

Dr. Atkinson: Very wisely did the Chair remark that this was a subject of great interest, because it involves the principles underlying the destruction, reorganization, and reproduction of the organic tissues. I think the value of every paper should be apprehended by the listeners and pointed out in their speeches, in order that in our communion together we may derive the greatest good therefrom. I am disposed to be complimentary, as others have been, to Dr. Harlan, and to thank him heartily for his able paper, and for the striking evidence of the exceeding faithfulness of his research, and for the lucid and liberal discrimination that he made, which did not seem to find a thorough lodgment in the minds of some of the listeners, when he said that there was a difference between the pathology of pyorrhœa alveolaris and of that species of destruction of the gum resulting from or compounded with the presence of salivary calculus or deposit. I think that is a point that did not find lodgment in the mind of Dr. Bogue, judging from the questions that he asked.

This mere preference for one article over another, in an empirical way, which has been touched, might be dwelt upon until we grow as gray as badgers, without taking one single step in that advance which should be the common purpose of us all.

Dr. Barrett touched the point precisely when he said that there was an important difference between an escharotic and a stimulant. I think he spoke more wisely or more profoundly than he would find a justification of in a critical analysis of his own remarks, or of what, by implication, might be derived from those remarks. Very few of us discriminate the difference between a stimulant, an escharotic, and a tonic. All these agents that have been spoken of have a direct influence to coagulate the albuminous portion of the tissues in the part, which produces as a result nature's own surgical dressing, so that by the operation of the functional law new tissues can be formed. But what is the process after this coagulation of

the albuminoid tissue occurs? It is a retrogressive metamorphosis of the layer of tissue immediately underneath that which has been coagulated. In the realization of this truth we find ourselves (a few of us who have studied this point) in advance of all the text-books in our understanding of the pathology and indications of the therapeusis of such conditions. The first step in this retrogressive metamorphosis is a return to the embryonal condition—that is, to that process which if continued would result in inflammation; but if it be carried no further than just to reduce the tissues to the indifferent condition that is called the embryonal or embryonic state, then there is a building up of the parts, by the action of the functional movement, that we call the production of new structure. When we shall have discriminated the difference between a cooking and a physiological hardening of the elements of the tissues, we shall be able to speak more learnedly and interestingly and understandingly and profitably about these processes that have so eluded the brain even of the best physiologists, pathologists, and therapeutists of the medical world.

There is one point with reference to which I think we should be more precise, and that is as to the strength of the escharotic that we are to use. That point was very unsatisfactorily covered by Dr. Barrett. He said he had not taken any measurement, and with him it was guess-so business all the way through. I have produced very satisfactory results by the use of twenty grains of chloride of zinc to the ounce of distilled water, and with that strength have been able to secure precisely the degree of coagulation of the albumen analogous to the coagulation that takes place in the evolution of the chick or any other embryon from any impregnated egg—that exact state of fibrillation of the lymph which is the first step in the construction of the tissues. What Dr. Barrett means by a saturated solution of zinc I confess I do not know. I have used as high as eighty grains to the ounce of water, but on the other hand I have made what I supposed to be a saturated solution of chloride of zinc, and have then found that I could keep on adding, *ad infinitum*, until I had a paste that was as thick as the best glycerin, so that there would be a thousand grains or more to the ounce of water.

Dr. Barrett: Without the addition of hydrochloric acid?

Dr. Atkinson: When I say water I mean water. If the gentleman supposes that when I say one thing I mean something else, he is entirely mistaken. I wish to be regarded and treated as if I was speaking the truth intelligently. If there is a distinguishing trait

in all that I say before this body, and have said from its origin until this hour, it is the endeavor to give my best thought, when it is only a thought, and to demonstrate it when it is concrete truth.

I have found that elixir vitriol and dilute aqua regia (one part to seven of water) are the best coagulants that I know of for that retrogression that is called waste of ligamentum dentium. That this is a local disease is proved to every man who is earnest enough in his desire to get at the truth to make his observations intelligently. It will sometimes start from the margin of the gum, from the point where the dental ligament is attached to the cement on the neck of the tooth, or sometimes from the end of the root, without involving enough to include the transverse process of the socket in which the tooth sits. The teeth most liable to these attacks are the cuspids. All who have studied the course of this disease, its diagnosis and prognosis, will agree, I think, that that must be a local expression of disease, at least. Whether there be a suggestion in that expression of an outside influence that has been lodged in the system, so as to admit of a debilitated condition throughout the entirety of the pabulum of the blood crasis expressed in that locality, I am not prepared to say. That is my thought, that it is only so very pronounceably local as that, when the disturbance in the blood crasis is so slight as only to be induced by some exciting circumstance in the affected region, such as the lodgment of a bit of fish-bone or something of that kind, which causes a breaking-down of the structure of the corpuscles that constitute this ligament at that point; and then the debility being centered at that point, the retrogression goes on by a chemical or physiological law, and thus we have those little pockets which are so familiar to us all. Wherever there is no deposit, either salivary, serumal, or sanguineous,—for these terms have all been used by gentlemen who have dwelt upon this question —then I seriously doubt the propriety of mechanical interference.

Let me define myself. My meaning is that I deprecate the use of an instrument other than an injection pipe or a syringe that will carry to the affected part these agents that I have spoken of; the compound tincture of aromatic sulphuric acid or the solution of the aqua regia of the strength indicated, to produce the coagulum that I referred to when I first took the floor—nature's scab—such as will grow anywhere in an abraded living human or mammalian tissue. You need not care about washing that away, because whatever there would be of extraneous deposits,—for instance, in the case of

the deposit of myrrh, at any point where there is water enough to take it out of its solution and precipitate it,—becomes part of the product of the retrogressive metamorphosis which goes on.

Dr. Shepard: I had some years since a case that has never been reported which may be of interest. A distinguished surgeon brought to me for consultation a patient whom he had treated for specific disease, but had been obliged to cease the exhibition of mercury three months before on account of what he considered ptyalism, and which he had been unable to arrest. He brought the patient to me to see if the teeth themselves had anything to do with the remarkable resistance to the ordinary modes of removing the salivation. He stated that he had, in pursuance of his custom, interrogated the patient in regard to the condition of his teeth before he commenced the mercurial treatment. His patient had recently had his mouth put in order by a prominent dentist, and supposed everything was in good condition. I examined the mouth, and found what I should have pronounced a case of pyorrhœa had I known nothing of the previous history of the patient. To what extent it was complicated by the specific disease and the effects of the mercurial treatment I could not tell, but I told the surgeon that I thought I could help him. He left the patient in my hands with the direction that whenever his gums were in good condition I should send him back. Pus could be expressed from the free margins of the gum, and the discharge was so profuse as to make a large spot on the pillow. I took the patient in hand, and with nothing but surgical treatment and a stimulating wash, which was the aromatic sulphuric acid diluted, syringed under the margin of the gum, I returned him to the surgeon in two weeks' time with the gums perfectly well. The surgeon then renewed the mercurial treatment without any recurrence of the trouble which he had been vainly combating for three months. The deposit under the gums, which in this case produced such extreme results, was very slight indeed, but was found on all surfaces,—labial, buccal, palatal, and lingual,—of all the teeth, and probably, disconnected from a specific disease and mercurial treatment, would not have attracted the attention of the ordinary dentist in his treatment of the mouth. Under the mercurial treatment what was so slight as scarcely to be called pyorrhœa developed into so acute a form as to produce this result, lasting for three months after the cessation of the mercurial treatment. The case is one of a number in my experience which lead me to continue in the belief which I have had for years, that this disease is largely due to an exciting

local cause, and is cured in a great majority of cases by a surgical operation, without any therapeutics at all except cleanliness. I have been much interested in the articles written by Dr. Harlan upon this subject, and in the paper to-night, and while I would not discredit or doubt the results that followed the treatment under his hands, I am willing to be put on record as still believing, as the result of my own experience, that a thorough removal of the accretions, with cleanliness and a slight stimulating application like the dilute zinc chloride or the dilute aromatic sulphuric acid, is all that is necessary for treatment.

We should take pains to impress still more strongly that salivary calculus and the deposit on the necks of the teeth which gives rise to this trouble are two different and distinct things. It is true that this disease is found in a pronounced form, or may be found upon every tooth in the head, where there is no salivary calculus whatever. It is true that the positions in the mouth where this disease is most marked are those positions where salivary calculus never comes, because the mouths of the salivary ducts are nowhere near. The palatal surfaces of upper molars and the labial and palatal surfaces of upper incisors and such positions in the mouth, which are distant from the mouths of any of the salivary ducts, are very liable to attacks of this disease. I am sure we all wish we could have more light upon its etiology. It is the one thing which we now need, and I do not remember to have seen anywhere any satisfactory explanation of the cause. Of course, until we get at that our treatment is empirical.

I have recently seen a case which I treated nine years ago, which was so extreme at that time that the patient could not masticate solid food. The lady is seventy years of age, and with the exception of two or three which I then considered hopeless has still all the teeth which I treated, and they are perfectly firm. In that case there was no treatment but a surgical removal of the deposits, and a slight therapeutic treatment, which was really a cleansing rather than a medication.

Dr. Peirce: It is not without extreme hesitation that I attempt to speak on this subject, and for the reason that the experience which I have had has led me to conclusions so adverse to those expressed by gentlemen upon the floor this evening, especially my friend Dr. Atkinson, a man who has been so accurate in observation and so profound in thought. I tremble in an attempt to controvert the opinions expressed by him. In common with other members of the

profession I have had many cases of what is termed pyorrhœa alveolaris, and I believe most emphatically that when conditions are found in the mouth like some of those recounted here this evening they are not pyorrhœa, but simply cases of local inflammation due to local causes, and such cases will yield readily to local treatment and get well. I believe that wherever cases have been cured by local treatment they are something different from the condition that I should term pyorrhœa alveolaris. I never yet have met with a case where urinary calculus existed that I did not find in the mouth of that patient to a greater or less degree this inflammatory stage. I therefore believe that this disease is more a local expression of a systemic condition. It is also found that the deposits from the urine in such cases correspond, to a certain extent, in chemical composition with the deposit found on the roots of the teeth. We find the disease more frequently, as has been stated in the paper, between the ages of twenty-five, or, you might say, thirty and forty-five. We find accompanying the disease, if not always preceding it, a calcification of the tubuli of the teeth, a filling-up of the pulp-cavities by calcification of the pulp. Then we find depositions of what has been termed sanguinary calculus, resembling tartar, upon the roots of the teeth, from the apical end up towards the neck. We find that the teeth are always indurated, and that the condition of induration precedes the breaking-down of the alveolar process. It precedes the exudation of pus from the alveolar socket. It precedes the inflammatory condition which we find in the gums. So much has been recognized by gentlemen who have studied the course of this disease. Efforts have, on frequent occasions, been made by gentlemen of our profession to stop its progress by drilling into the pulp-cavity and devitalizing the pulp, expecting by that means to stop the calcification of the teeth, and so stop the progress of the disease, but it has always been without avail. Treatment in my hands has been most effectual—not in curing the disease, because I do not believe it can be cured, but—in modifying its progress. I have never yet seen a case that has been cured, and I do not believe it possible to thoroughly cure a condition which I should call pyorrhœa, and which was the result of a systemic disturbance, but I believe that its progress can be stayed and the teeth saved and kept in the mouth for ten, fifteen, or twenty years by careful treatment. I could show gentlemen on this floor teeth in the mouths of four or five of my patients where, for instance, a central incisor had been partially dislodged and thrown forward until it was disfiguring.

This tooth has been carefully brought back into its socket, has been ground off so as to make it articulate properly with the opposing tooth, and by the use of wire strings, passed through holes drilled in the adjoining teeth and in the affected tooth, tied into place and held there for six or eight years. These teeth are still retained, but they have always been kept under treatment. Every three months at least the patient has come to me, and with dilute aromatic sulphuric acid the pockets have been thoroughly washed out by the use of a stick shaped into a little flexible spatula, upon which a few fibres of cotton were wound. In this way I have washed out the pockets and cleansed the neck of the tooth as far as the gum was loosened, and that has been the treatment for the last seven or eight years. I did at one time use the chloride of zinc, but latterly have found that the aromatic sulphuric acid has served the purpose better. I do not believe accumulations of tartar are the cause of this disease. I believe they accompany it by reason of a systemic condition, which predisposes and produces or occasions this deposition, which, by its presence, acts as the exciting cause to further stimulate the progress of the disease. I believe that the most successful treatment consists in a complete removal of all such exciting causes, and the keeping of the pockets cleansed out every two or three months with aromatic sulphuric acid, as just stated. In that way the teeth may be kept in the mouth for years and be made useful, while without that treatment they would be lost very much sooner.

Dr. Rhein: I think the keynote to the lack of success in the treatment of this disease is lack of knowledge of its etiology. I can bear out Dr. Peirce as to the symptoms observed, but I have drawn other inferences from them. I have seen cases where after constitutional treatment was stopped there had been a recurrence of the pyorrhœa. It is an open question whether in such cases the recurrence is due to the dropping off of the constitutional treatment or to the neglect of the patient to keep the mouth clean. I think that when we find out about the cause of pyorrhœa we will conclude there are different forms of it.

Dr. Field: The assertion made by Dr. Harlan and strongly reiterated by my friend Dr. Shepard, that there was a distinct difference between the deposits accompanying pyorrhœa and salivary calculus, indicates that we ought to understand more about this difference than we now seem to. I understand there has never been made an analysis of the substance which is deposited around the roots of the teeth in pyorrhœa. We do know what salivary calculus is,

for that has been analyzed. But if we do *not* know what the deposit is which comes on the roots of teeth in cases of pyorrhœa, how do these gentlemen know that the substance deposited in pyorrhœa and salivary calculus is not one and the same thing. I feel more powerless in the treatment of this disease than of any other that comes under my care, while I think there is no disease which is of more importance to thoroughly understand than this. I have no doubt there are many others who like myself have found cases where it seemed impossible to tell where pyorrhœa began and salivary calculus left off. I do not believe we shall be able to do this until we have the analysis of the substance which is deposited in pyorrhœa. I think these investigations which Dr. Harlan has carried on have developed one of the most interesting subjects which could be discussed before this Association, and I am sure we shall all eagerly look for any new light that he or any others can give us in the future which will enable us to make correct diagnoses of such cases.

Dr. Odell: I do not wish to show any antipathy to any special mode of treatment, but I do wish to call attention to some points which I think should be brought to your particular notice. The indiscriminate use of so strong an agent as aromatic sulphuric acid is almost certain, it seems to me, in the hands of even very intelligent practitioners, to frequently work a great deal of evil. I would not dare to use it in the loose way that some members of our profession seem to advise. I remember one patient for whom I applied aromatic sulphuric acid very faithfully for a time, and the case was progressing favorably; but owing to his objection to the length of time required—time which he could not afford to spare from his business—I allowed him to apply it for himself, with the result that the right central was denuded of its pericementum on one side of the root clear up to the apex. Had that been all I would not have minded it, that being a pulpless tooth, injured accidentally, from which not much could be expected anyway, but he used it for the other central, a comparatively healthy tooth at the beginning of the treatment; but before he got through and called upon me for inspection, he had succeeded in removing the pericementum from the neck of this tooth also, for a space one-sixteenth to one-eighth inch in width. My own experience in this and other cases leads me to be very much afraid of allowing patients to assist in the treatment. The chloride of zinc is worse, if anything, for if you are not very careful in the use of it, you are liable to have marks left. I

wish to call attention to these things, because I believe it is dangerous to go in too heavy on trying things before understanding their action, and because the younger members of the profession should never omit to supply the necessary "grain of allowance" when receiving instruction and recommendations from those older who never have failures.

Dr. PEIRCE: If I left the impression on this body that I recommend the use of aromatic sulphuric acid indiscriminately as a mouth-wash by the patient, I certainly left an unintentional impression and a bad one. I thought I said very distinctly that I used it on a stick or spatula, with a few fibres of cotton on the end. That is what I meant to say. In the case suggested by Dr. Odell, if the tooth was forced out of place by accident, as I should suppose from what he said it must have been, I would not consider it a case of pyorrhœa. I use sulphuric acid in pyorrhœa alveolaris in my own hands. I do not recommend my patients to use it. While I am on my feet I want to speak of the desire of the patient in such cases generally for acid drink. I never had a patient who was suffering in this way who did not crave acid drinks, and as often as they craved it I recommended them to use it in such form as would be agreeable to their taste.

Dr. ALLPORT: As Dr. Harlan has included in the addendum to his report what I said before the Section in regard to the use of eugenol in the treatment of exposed pulps and alveolar abscess, I will simply say that I have used it in a case of eruption on the face which had resisted the treatment of some of our very best physicians who make diseases of the skin a specialty, and with entire success, by the simple application of a one-per-cent. aqueous solution.

With reference to pyorrhœa alveolaris, it has been well said that there is a great difference between simple inflammation of the gums caused by the mechanical irritation of salivary calculus and this disease. The latter may be entirely from systemic or constitutional causes, and a large majority of incurable cases are from these sources; while inflammation of the gums from the accumulation of tartar is local, and needs little treatment other than the simple and complete removal of the irritating agent.

But pyorrhœa alveolaris is frequently found where the teeth are kept scrupulously clean. In fact, some of the worst cases I have seen have been in the mouths of my most careful patients; we must, therefore, look to some other than mechanical irritation for the origin in such cases. It must be systemic. In my judgment a very

large proportion of these cases are from uremic trouble of some kind, and I have observed quite generally that patients with pyorrhea were also suffering with some form of uremic trouble, and when relieved of the latter, the former disease yielded more readily so treatment.

No doubt bacteria aggravate and are largely instrumental in continuing all forms of pyorrhœa; but if its origin is systemic we must look beyond local treatment for its radical cure. We may palliate and greatly benefit by local treatment, but if the cause is systemic, without proper constitutional treatment the disease will recur.

Wherever we find pyorrhœa we find bacteria, and wherever we discover bacteria we usually find pockets made by them; and whether these micro-organisms excrete a substance that acts upon the alveolar wall analogous to that claimed in the decay of the teeth, may be questioned, though quite likely that may be the case.

In all forms of this disease mechanical treatment is necessary, and usually the local application of medicines will be found useful, and in their employment three properties are important. They should be capable, when necessary, of dissolving out the lime-salts of the diseased alveolar walls until healthy tissue is reached, as in the treatment of diseased bone in any other part of the body. They should have the power to destroy these micro-organisms and also be a stimulant to healthy action and the formation of new tissue.

Acids, some of the metallic chlorides,—such as tin, mercury, silver, and zinc,—and eugenol, possess some of these properties in various degrees. But they should be used intelligently, and with a distinct understanding as to their effects, and not empirically, nor because Dr. So-and-So used them.

Dr. Jas. Truman: I feel like indorsing Dr. Harlan's paper on one point at least, and that is in regard to the deposits in pyorrhœa alveolaris. To my mind there has never been advanced a more absurd theory than that this disease is produced by deposits of tartar. I have endeavored to investigate this matter for the past fifteen or twenty years,—ever since the French writers gave it its present name. Now, it does seem to me that we do not get at this matter properly. What is pyorrhœa alveolaris? Is it anything more than a local irritation, aggravated by systemic conditions? I think not. Then it is nothing more than alveolar abscess translated from the apex of the root to the neck. In other words it is an irritation of the pericementum. That irritation may take place at any point. What is

the condition in alveolar abscess? Is it not inflammation of the pericementum, followed by absorption of the alveolar process? How is that absorption produced? By pus, which is recognized as being composed of white blood-corpuscles—leucocytes—which have wandered by emigration. Now, it was demonstrated years ago by von Recklinghausen that the white blood-corpuscle, examined in the living state, was a very different thing from what it had theretofore been considered. The changes of form that it undergoes are of the same nature as those of amœbæ and it possesses the same power of absorption and locomotion.

In proportion, then, as we have these amœbæ, wandering cells, or leucocytes,—whatever you choose to term them,—you will have rapid absorption of the tissues. What is the condition at the neck of the tooth? We have there irritation of the pericementum; then formation of so-called pus, which absorbs the alveolar process. Now, in my opinion, we need first, to treat the pericementum. As has been already stated, there results in the progress of the disease a large and increasing number of bacteria. All of you who have worked with the microscope, know that this term bacteria covers a great variety of forms. While retaining their original character in pyorrhœa alveolaris, they largely increase both in numbers and size and become a powerful irritating force. We can do nothing until we remove these by an agent capable of destroying them; then we can act on the surrounding tissues. We must have drugs for this purpose. The idea that has been promulgated, that you can cut and slash around the roots in such cases, is one of the barbarisms of dentistry. You cannot, in my opinion, remove the pericementum in that way and expect a renewal of tissue. There is no deposit there to remove. Why is not pyorrhœa alveolaris present in the posterior portion of the inferior teeth? Tartar is seldom absent; but this disease is rarely manifested there. Irritation begins at the neck of the tooth, and in consequence we find there an increased number of bacteria. They increase the irritation, and then absorption takes place, and so on through the whole process. All cases of absorption are not caused by pyorrhœa, however. As Dr. Peirce has truly said, this has nothing to do with the absorption of the pericementum in calcification of the teeth. It is the cessation of nutrition by closure of the tubuli; the destruction of the tissue goes on, through the operation of a natural law, and the tooth is thrown out as a foreign body.

A word in regard to treatment. I approach that subject with

some degree of hesitation, after the able remarks of Dr. Harlan. I agree with him fully in most that he has said; but I confess that I cannot understand how any gentleman can arrive at any degree of success with the use of aromatic sulphuric acid. I have found the best results in the use of pure sulphuric acid, which I am not afraid to apply, in reduced strength. I have followed that always with bicarbonate of soda, to neutralize the acid on the teeth. In my hands one application, when systemic influences are not operating against the treatment, has been almost invariably successful. To maintain the good results, I have been in the habit of prescribing a mouth-wash of thymol, and keeping that up continuously.

The treatment, then, should be, first to destroy bacteria; then, by the use of some irritant, to arouse new granulations, and then to keep the mouth in a healthy condition. I have found, recently, very great satisfaction in the application of a very common remedy, that I am not aware has been previously used for this purpose,—the sulphate of quinia. The effect of this is to inhibit the movement of the white blood-corpuscle and through its antiseptic property to destroy germs. Through this dual capacity it prevents inflammation. As I have only recently experimented with this agent I cannot, therefore, speak with any certainty of its value in extensive inflammations; but the results so far attained promise to give it prominence in the treatment of the disease under consideration.

Dr. Shepard: I wish to make a request of gentlemen who speak of treatment, that they be a little more explicit in stating just what the treatment is; and, if explaining the use of therapeutical remedies, that they state the strength of the remedies they use. A criticism was made last evening that sulphuric acid was a dangerous material. I said I used dilute aromatic sulphuric acid; that was indefinite. I should have been definite and stated that I use it in the proportion of one of acid to three of water. Hardly anyone who spoke last night was explicit in stating the strengths of the remedies used. The proportions should be so exactly given that we can intelligently follow the treatment recommended.

Dr. Searle: I would like to ask a question: In the first place, why use these various remedies for pyorrhœa which were named here last evening? I think we have not gone deep enough into the nature of the disease. We hear it suggested, sometimes, that decalcification and caries are synonymous terms. I should as soon think of saying that decalcification and pyorrhœa are synonymous terms. Both caries and pyorrhœa are diseases of the soft tissues.

The lime-salts have little to do with them, in my opinion. If I have rightly studied pyorrhœa it is a disease of the pericementum. It is set in action by some irritant. That irritant may be tartar acting mechanically, or it may be low organisms acting physiologically. But, whatever it is, inflammation is started in the pericementum, and it works itself far down between the alveolar wall and the cementum, often before it makes itself manifest at all. The disease has been in progress for a longer or shorter period before we know anything about it. Unless we can apply our remedies to the part affected, we might as well throw them upon the sidewalk. We all know that disturbances of the mucous membrane are not pyorrhœa. We know that inflammation of the pericementum in itself is not pyorrhœa. Now, when does pyorrhœa commence? At a certain stage of inflammation the pericementum itself becomes organically diseased. It becomes a changed tissue. You can hardly separate the changed pericementum from the cementum. In order to cure the disease we have to remove all foreign matter and diseased tissue; we have to go down to the point of union between the healthy and the unhealthy portions; we have to treat it as a disease and not as an injury; we have to recognize that this disease has its seat in the living membrane. The question is, how shall we reach that point most safely to the living cells. We all agree that all foreign substances must be removed thoroughly, so that the tissue may have a chance to live. After having performed a surgical operation I dress the wound as nearly antiseptically as possible, because I am told by those who ought to know that, in some cases, at least, it is a genuine germ disease, and as such needs antiseptic dressing. The best dressing with which I am familiar is full-strength carbolic acid, applied as Dr. Peirce said last night, far down at the point between the healthy and diseased tissue. Reach the seat of the trouble and apply your remedy there. If any germs are present the carbolic acid, full strength, will take care of them by coagulating the albumen of the tissue.

How about repeating that operation every few days, or every week or two? Let it alone most severely. Having once performed the operation, having once amputated your limb or your part, and having dressed it, let it get well. For the sake of the comfort of the patient, for the sake of your own satisfaction in seeing the tissues healed, give nature a chance to effect a cure.

Something has been said in regard to external friction of the gums. Probably it is the best way the patient can press out the

loose foreign substances that lodge between the gum and the root of the tooth, which, with the brush, can then be carefully removed. After which the mouth should be furiously rinsed with water.

Dr. Stockton: I understood, in the discussion last evening, one gentleman, very prominent in the profession, to state that this disease was a matter of deposit alone, and he left us to infer, at least, that it could be cured by cleanliness. Another said a saturated solution of a certain acid would cure it. Another gentleman, equally prominent, said there was no such thing as a saturated solution of that acid. I would willingly and gladly sit at the feet of any of these gentlemen and drink in wisdom from them, and yet from the discussion we have had I confess that I know no more about how to treat this disease than I did before coming. Some say it can be cured. Dr. Peirce, a very eminent gentleman in our profession, has said very distinctly that he does not believe that it can be cured. The only point that I would emphasize is this,—that we are greatly obliged to Dr. Harlan for what he has done in the direction of cure; but he has started, perhaps, a little at the wrong end, for, as Dr. Barrett wisely said last night, the etiology of this disease is what we wish to understand. When we thoroughly understand what the disease is, the mode of its treatment and cure will, I think, be readily determined.

Dr. R. Finley Hunt: I desire to take advantage of this occasion to return publicly to Dr. Harlan the thanks that I expressed to him last night for the pleasure that I derived from listening to his paper. There can be no doubt of the importance of this subject. If there had been any doubt it would certainly have been dispelled by the interesting and instructive discussion to which we have listened.

In investigating the etiology, pathology, and therapeusis of pyorrhœa alveolaris, if we follow out the path that is plainly marked for us, we will be led on from the examination of that disease as a merely local matter until we come into the field of dental hygiene. Following the continuation of that path, naturally we will be led into the broad field of general hygiene,—fields that, in my opinion, are so closely connected as to be inseparable. All local diseases are but local expressions of constitutional or general disturbance, determined towards the point of the locality by circumstances with which we are at present unacquainted. And we would not go far amiss, I think, in studying the etiology, pathology, and therapeusis of any local disease that comes under our care, if we were to commence at the beginning and look to the necessity for general consti-

tutional treatment. It seems to me that the observations of gentlemen who are eminent in our profession have established as a fact that those tribes and races of people who live simply, in accordance with the laws of nature laid down for the preservation of health, have teeth in better condition than those who live as we do, artificially. So that in investigating this disease we have to take into consideration the great laws of hereditary tendency and the habits of living, and if we can secure a good condition of general health, then these local diseases will be much more easily cured, if they do not disappear altogether. It is a maxim in medicine, that if the cause of a disease is removed, the effect disappears, and that is based on the principle which was so beautifully illustrated to my mind by Dr. Atkinson last night, when he said that medicines themselves do not cure! Medicines place the circumstances of the trouble in such a condition and relation, as regards the tissues, that nature with her recuperative powers is enabled to perform her beneficent work of rebuilding and reforming.

I desire to express an opinion with reference to a remark that was made last evening, which attributed the existence of pyorrhœa alveolaris to a diseased condition of the urinary organs, to the deposit of calculi in the blood, or to diseases of that nature. My own view is that both these diseases—the diseases of the urinary organs and pyorrhœa alveolaris and similar affections of the teeth—are the results of systemic condition, and not one because of the other. I have found a close relation between the condition of the teeth and gums and their ability to resist the attrition of mastication, and the state of the kidneys and the blood.

Dr. Searle: I forgot to say that my opinion with reference to the use of full-strength carbolic acid is based upon my own experience. I have had a number of cases where I have tried unsuccessfully to arrest the progress of the disease until I adopted that treatment. For six or eight years I have been pursuing that course of treatment with good results.

Dr. Peirce: I feel sometimes, when I am so misunderstood as I have been in this respect, that I have left unsaid things that I should have said, and have been understood as saying those things that I did not say,—I feel sometimes that I will never open my mouth again in a dental meeting. The impression that I meant to give last night was, that there are conditions of the teeth which we term pyorrhœa alveolaris which are due to systemic conditions.

I meant to say, further, that when there has been a deposition of

urinary calculus, so far as my own experience has gone, in every case I have found that condition of the mouth which we term pyorrhœa alveolaris. I did not intend to say that urinary calculus was the cause of the pyorrhœa. I do not believe that. I only meant to say that the systemic condition which resulted in the one, was equally the cause of the other. Hence, we may sometimes use the presence of the pyorrhœa as a means of diagnosing the presence of urinary calculus, or rather, the presence of pyorrhœa would be a sustaining feature in favor of urinary calculus. I said, further, that I did not believe a patient under such conditions could be cured without a change in the systemic influences which induced the condition. There are conditions which we term pyorrhœa which are simply the presence of pus in the alveolar socket, and that may be due to local causes. If these local causes are removed, the disease will subside. But when it is the result of a systemic condition, as I said last night, I do not believe it can be cured, unless that systemic condition can be relieved. I am strengthened in this conviction by the fact that it is very largely a hereditary tendency. I think that if we will make inquiry of our patients we shall find evidence of this,—indeed, we are often told without inquiry,—"My mother, or my father, lost all their teeth in that way. They all came out without decay." How many of you gentlemen have had your patients tell you that? I think many of you will bear me out in my conviction that it is a transmitted tendency. I do not mean that the disease is transmitted; but I do believe in the transmission of idiosyncrasies,—of tendencies which, given an exciting cause, will bring about the disease. I hope I have made myself understood.

Dr. Watkins: I have had some experience in treating this trouble, and I would like to describe just one case. I understood Dr. Peirce last evening to say that he did not believe that, in any case, the real pyorrhœa could be cured. I have thought that I have cured pyorrhœa. I will describe a case similar to the one which Dr. Peirce described last evening. It was that of a lateral incisor, elongated, and pressed labially out of its position considerably. The pus was oozing out from all the surfaces, except a small space on the labial surface, and the tooth was very loose. I examined it, and found a very little tartar, about half way up the root. That I removed, and I also removed the edge of the alveolar process which was necrosed, until I got to healthy bone. I then applied aromatic sulphuric acid, full strength, and carried it up as far as I could into the seat of the trouble. Before I did that, however, I cut the tooth off

and trimmed it up to its proper shape, so as to correspond with the other teeth. I tied it with a platinum wire, and let it remain so. I made the same application in one week from that time, and then let the patient go, seeing her again in three months. At that time everything, except one place in the mesial surface, had a nice, healthy appearance. At that place, I supposed I had not removed all the necrosed process; so I made another operation, and applied the aromatic sulphuric acid, full strength, in the same manner, to the surface affected. That was three years ago. The tooth is now sound in its socket, and there has been no recurrence of the trouble. She has had the same trouble in other teeth since then; but in the case of that particular tooth there has been no recurrence. This lady was about forty-five years of age, and in rather poor health. I was surprised to hear a remark from one gentleman last evening, warning us not to use aromatic sulphuric acid carelessly, and to hear the gentleman say that he gave it to his patient to use himself. The same thing might be said about almost anything in the dental materia medica. Almost all our medicines are powerful, and to my mind it will not do to trust them in the hands of our patients.

Dr. How: I would like to submit for inspection an instrument designed to aid in the surgical treatment of pyorrhœa, especially in the removal of accretions from the apical portions of the roots; and also a small instrument designed to aid in medicating the apex, so that whatever medicaments shall be used may be carried in very small quantities, by means of this small platinum tube, directly to the affected part. The edges of the instruments are square, and will remove with a pulling or a pushing cut. The sides will scrape the diseased alveolar process.

(Dr. How here exhibited the instruments referred to.)

Dr. Harlan: If the discussion is ended, I would like to make a few remarks. Last evening one gentleman in discussing this question wished to know how you could discriminate between a salivary deposit and serumal or sanguinary deposits. To my mind there is a vast difference between the physical appearances of those deposits. It will be found on examining the calcareous or salivary deposit, that the pericementum has not been detached beyond the line of deposit. In any event, the serumal deposit on the roots of the teeth or necks of the teeth is not continuous, but broken up into little islands, if you please. It will be impossible to lift the pericementum from the roots of the teeth beyond the line of deposit of the salivary calculus.

Whatever may be the initiation of pyorrhœa,—mechanical, chemical, or traumatic,—whatsoever it may be, it has a beginning at the gingival margin. The integrity of the ligament surrounding the neck of the tooth must first have been destroyed, and this ligament must have been separated. Now, after you have this condition, it is easy to understand how serumal deposits may accumulate. It is believed that in connection with this injury micro-organisms of a peculiar form are found; that these micro-organisms themselves manufacture a soluble ferment, which destroys the tissue in advance. If that theory be correct, it is necessary that a remedy to destroy micro-organisms be injected. The reason for the frequent re-injection of the pockets is that while you may destroy the fully developed organisms, you may not at once destroy the spores, so that it will be found necessary to keep repeating the process every three or four days, until every spore has been destroyed. The theory that a special form of life is present in these pockets at the beginning of these attacks, and that they form a soluble ferment which destroys the tissue in advance, has been put forth by Dr. Black, of Jacksonville. Some other gentleman has spoken of the necessity for friction. I have labored under the impression that the friction of mastication would, under ordinary circumstances, be sufficient. If the teeth are so loose that they cannot be used except by wiring them, they should be wired, and the patient will then have no difficulty in using them. A lady who has been under my care, coming from a distance, stated to me about a month ago, that within a few weeks past she had been able for the first time in three years to masticate solid food. She has gained more than twenty pounds in two months and a half since the commencement of the treatment of her mouth. She told me that she had had more satisfaction in the use of those teeth during that time than for the three previous years. When a gentleman so eminent as my friend Dr. Peirce rises on this floor and states that it is impossible, in his belief, to cure a case of pyorrhœa alveolaris, which he desires to define as coming from a constitutional cause, and further states that the remedial treatment of such cases is confined to one remedy, which remedy, according to his own statement, it would be impossible in every case to get to the diseased spot by the method stated,—with a spatula,—I do not wonder that he believes it impossible.

I have had hundreds of letters from gentlemen all over the United States, and have visited the offices of a number of them who have written me that they were trying the treatment I recommended

and then asked me to see their patients; and when I asked them for the remedy or the remedies, or the instruments to show them how to manipulate, and how to use the remedies, they did not have them! Now, how can gentlemen expect to accomplish anything unless they themselves will faithfully try to be honest. It is no just criticism upon a method of treatment proposed, when the critic himself does not practice or attempt to practice that which is advocated, and which he condemns.

Dr. E. Parmly Brown: There seem to be two grounds taken by the gentlemen in this discussion. One is, that pyorrhœa alveolaris cannot be cured; the other, that it can be cured. Who would think of condemning a physician, who has been treating a case of chronic sore throat, because the sore throat re-appeared in a year or two? What dentist would blame another for having once, to all appearances, cured a case of pyorrhœa alveolaris, because the disease had recurred in three or four years? It takes several generations to cure and eradicate this disease. It is in the blood,—"in the family." The child says, "My mother's teeth all dropped out. My sister's teeth commenced to drop out. I have been coming to a dentist since I was a child for this particular disease." Dr. Harlan is right. He has cured some cases. So have you; so have I; but can any of you tell what condition those cases will be in five years from now, or sooner? Many of them will require further treatment. Does a man let his wooden house burn down because it has caught fire two or three times before, while his neighbor's brick house never gets on fire? No, sir. He takes a pail of water and puts the fire out when it starts again, if he can. We must do the same with pyorrhœa alveolaris.

Dr. Shepard: From my observation of this disease, I think it is possible to wipe it out in the first generation. Whatever constitutional tendencies there may be, I think it is entirely within the province of the dentist to prevent it, in every individual case, from occurring in the descendants of those who have suffered from it. It is curable to the extent that any disease is curable. It can be so far kept down that its ravages shall not work destruction to the tissue. By taking it in the early stages, there will be no loss of the alveolar process, no inflammation of the tissues, and such a degree of health can be assured that the teeth shall be firm, and continue firm through a long life. In families where the father and mother have both been sufferers and the children have come under my care at the proper age,—when children in educated families do come into

the dentist's hands,—I have found this to be the case. The hope of the future for our patients lies, it seems to me, in our belief in this truth, and in our spreading it among our patients to such an extent that they will bring the children to us for care and treatment early in life. As Dr. Peirce said, it is only tendencies which are hereditary. Those tendencies we need to watch for, and when we combat them at an early age, there is no injury to the patient.

There is one other criticism which it seems to me should be made upon the discussion, so far. That is, that the terms have been very loosely used; so loosely, that it would seem as though some of the gentlemen who have spoken did not understand what they were talking about. I do not think that is probably true; but it is true that terms have been used very loosely. The term pyorrhœa, as is probably known to a majority of those present, is merely a name for one of the symptoms which are visible; the meaning of the word being simply "pus-flowing." This refers to only one manifestation of this disease, either that there is pus flowing from under the edge of the gum, or that it can be forced out by pressure. Of course, using the term as we do, we make it express other symptoms and conditions,—the loss of the soft and hard tissues, the inflammation which is present. It seems to me we should keep as closely as possible to an exact definition and use of terms. There is no name, among the many which have been suggested, which exactly expresses this disease. Many have been seeking for a name which should include more of the symptoms. I have felt for years that it was a legitimate office of this body to introduce terms, and insist on the accurate use of them in these discussions. The Section on Nomenclature already exists, but it has, in my opinion, almost entirely ignored its legitimate meaning and design.

Dr. Atkinson: Let us get our minds back to what disease is and how it comes, and whether it is capable of being limited or annihilated; whether, indeed, it is or is not self-limiting. There is such a thing as antidoting a diseased activity which is the result of the introduction of a foreign element into a functioning body. One gentleman very wisely said that it had become an aphorism in pathology, as it had in physics, that if you remove the cause, the effect ceases. Every phlegmonous abscess is self-limiting and self-curing, if you do not interfere with it. There are two modes of its limiting and two modes of its cure. One mode of limitation is by spontaneity of the functioning power in a body, where the production of the diseased activity goes in the direction of the least resistance;

hence, if you have the beginning of a pustule, boil, or phlegmonous abscess near a bone, it will go toward the soft tissue, by reason of the greater resistance of the denser tissue, until ripened. If you press upon that, so as to prevent influx of the pabulum that is wept out from the capillaries, you will abort your boil. Nature sometimes does that by the surprising of the nutrient current by the reception of good or bad news. You will say that is going into figment and fancy! but we live by figments and fancy. It is the first impression that sets the deflection up which results in that which is called disease. So the same forces may kill or cure, or they may poison or heal.

Every alveolar abscess would be cured by spontaneity if there were no foreign element there, just the same as a boil in the soft parts, when it bursts, and the core, as they say, comes out, heals spontaneously. Why do not these cases of pyorrhœa alveolaris heal? Why do not what used to be called fever sores heal? Simply because of the introduction of micro-organisms floating in the air, which set up a ferment that is adverse to such healing, so that the tissues cannot be rebuilt at that locality, and you get a succession of discharges. I have cured abscess of twenty-four years' standing, on a superior central incisor, in eight days, by simply removing the fistulous tract, and injecting with a compound of creasote and oil of cloves, equal parts. It is folly to talk about its recurrence. A recurrence of disease in such a case is the recurrence of incompetency on the part of the investigator, or else the recurrence of malevolence, in the having of a bad habit, to persist in a wrong position, knowing it to be wrong. These cases that have been spoken of as a recurrence of the disease, if they were a recurrence in the true sense, were simply outbreaks in a territory that had only been half cured, little tracts having been left in which bacteria could lodge and find oxygen enough to keep them alive, to break the tissue down again. Now, by the recuperative law of nature, there must be a making of its way to the surface, a discharge of this broken-down tissue from the system, or, taking the other course, its encystment. What is encystment? It is the inclosing of a body that has no affinity for the tissues, or even compatibility with the tissues, by a substance so indifferent in its movements of nutrient activity that it makes a pellicle which is nearly a mineral. When that is made a mineral, the next to it will be of a vegetative character, and the next outside of that will be the lowest form of animal functioning. Thus when you get a ball or any other foreign substance encysted

in the tissues, it may remain there for years. I have in my own person a splinter of wood that is now so nearly absorbed that I can hardly find it, except when the tissues are a little lax from a debilitated condition of the body. The point to which I wish to draw your attention is that where you have a body that is inimical to the organization, the organization will make an effort toward self-cure. It is not the medicine that cures. In the physical economy we find a poison or a remedy in the same force. We must get rid of this idea of specificity of activity, and get back to an understanding of the divine radiancy that makes planets and the inhabitants of planets; that it is that divine energy which we call solar influence that does this work. But to this solar influence, this universal force, you must add a plus—that is, the unseen element. This great energy whose first expression is light—this and plus work all things operated on this planet. Each individual human system is a solar system with all its planets. That they say is away in the clouds, and so it is. But each one of the elements of the tissues must have its little share of divine radiancy, to the measure of its demand. When it has that there is a wholesome condition. When it is offered more than its demand, it will not take it. When it gets less, it sets up a howl and asks its neighbors to help. When they contribute of their little, they decay, and here is the point of entrance of the mischief, of the unkindly movement which is entirely beyond the perception of any eye, yet illumined to the understanding mind. When we shall have understood that there is a limitation to the possible life by nutrition of any of the elements of the tissues, we may see that there are times when they come of age, and go out by a sort of senility—that is, a rejuvenescence, by passing into another mode of expression. That is what we want to take hold of in these very conditions, where we need to have something to annihilate the bacteria in all ulcerated-suppurating surfaces.

I told you last night a number of remedies. Another is a saturated solution of salicylic acid in alcohol, which coagulates the coagulable part of the tissues so beautifully as to make a dressing of its own, allowing a building-up, a reproduction of tissues, taking the same steps that were taken in the building-up of the original structures.

The teeth are a very favorable territory in which to study all the laws of organization. For instance, in the enamel we have an analogue of the mineral kingdom. In the dentine we have an analogue of the vegetable kingdom. In the pulp we have the veritable ani-

mal kingdom, operating under the law of radiancy according to the type to build it up. The enamel is built once for all. The dentine is built once for all, in the primary dentine, but the secondary dentine is, under healthy conditions, continued until the pulp itself is obliterated. As in the ruminants, all those creatures that feed upon grass, the grazing animals, which are subject to a wearing away of the incisors, we have the successive steps involving calcification, consolidation, and dentinification, carried on to the very end of life, as we can see in examining the teeth of old cattle. When we understand these laws, as expressed in organisms, high and low, when we are impelled by a desire for the benefit and advancement of others, we will then, indeed, become the divine healers, to be which we all aspire.

The exanthemata and all specific diseases are self-limiting. In a perfectly vigorous organism none of them would take root or hold. So that even in those diseases which we call specific, scarlatina, small-pox, and all the exanthemata, there can only be a taking hold where nutrition is somewhere unsatisfied. It is well known that there are some persons who cannot be inoculated so as to transfer vaccine virus, so as to set up that retrogressive metamorphosis which must exist in such cases, and which leaves the unsightly mark so familiar to us all.

SECTION VII.

Physiology and Etiology.

Report by W. C. BARRETT, Chairman.

[Before making his report, Dr. Barrett passed around several sealed tubes containing pure cultures of several of the forms of micro-organisms found in the mouth, which he stated were prepared by Dr. Miller, of Berlin.]

Physiology.

PHYSIOLOGY may be defined, the study of function. Everything, therefore, that has special reference to the nutrition of the body, to secretion and to excretion, may be properly considered under this head.

Digestion is a function the object of which is the preparation of alimentary substances for assimilation, and the separation and expulsion of the excrementitious portion as fæces; assimilation is the function by which living bodies appropriate and transform into their own substance the products of digestion. Both together constitute the function of nutrition.

That the condition of the organs which it is our special province to care for is very largely dependent upon their nutrition, no thinking man will deny. In many instances a perversion of nutrient currents, a lack of tone in the assimilative or digestive machinery of the system, is primarily manifested in the teeth. A perfect apparatus must perform perfect work. Given, then, an individual with a healthy, normal nutrition, the teeth should, in the absence of malformations that may be denominated accidental and extraneous to the present consideration, be anatomically and histologically perfect. Subsequent lesions are, of course, pathological, either externally or internally, and their consideration is not pertinent to the present inquiry. Given, again, an individual with structurally imperfect

teeth, and it follows, if our reasoning be correct, that the fault is nutritive.

What, then, is the exact source of the lesion? Is it in the digestive or the assimilative functions? Is it pre-natal, and therefore maternal, or is it personal to the diseased organism? Is it general or local? Is it due to improper or imperfect alimentation, or is it strictly and entirely functional? These are questions that may well make us pause in the generalizations with which we are apt to stifle the inquiries that naturally arise within us.

It has been urged that our structurally imperfect dental organs are due to unnatural habits of life; to improper diet; to the vicious preparation of articles of food; to the removal of necessary ingredients from that which nature has provided as pabulum; in fine, to an artificial and abnormal manner of living. In a paper previously published I have considered these points. You will allow me to repeat some of the conclusions to which I there arrived.

If imperfect teeth be due to any of these things, it will only be necessary for us to go back to the natives who were free from all the so-called vices of our modern civilization, to find a different state of affairs. During the past year I have received the testimony of many observers who were stimulated to inquiry by the published accounts of the condition of the teeth of certain pre-historic races. I have received letters from many professional men who have made examinations, more or less critical and exhaustive, of collections of skulls in all parts of the world, and of very many of the earlier races of people, who existed under the most diverse conditions, in all extremes of climate, whose habits of life were the most widely varied, and whose food ranged from the almost exclusively fruit diets of the tropics to the wholly animal alimentation of the frozen regions of the far north. With a single exception, all these observers bear witness to the fact of the existence of nearly all of the dental lesions of the present day; and the general verdict has been that, from the earliest times of which there remain dental traces down to the present, there have been little other than local changes in the condition of the dental organs. Our honored President exhumed about a dozen skulls of the early Egyptians, and the impression upon his mind was that they were comparatively free from the evidences of oral diseases, but, as I understand, he made no records at the time, and his evidence is but the dim recollection of hurried observations made some years since. In any case, the number of skulls examined was not sufficient to indicate anything more than a possibly acci-

dental deviation from the general condition. Dr. J. J. R. Patrick, of Belleville, Ill., has exhumed and examined the skulls of thousands of American aborigines,—races that existed long previous to the advent of the American Indian,—and his evidence is positive upon this point.

These records are fatal to the theory that dental lesions and imperfect structural development are modern, and due to our present artificial habits of living.

It is true that wild animals, in the absence of interfering accidents, have perfect dentitions; but it is also true that in them traumatic lesions heal without suppurating inflammation, indicating more perfect function. (In an examination made this summer of the skeleton of the *Elephas giganteus*—the Mastodon exhumed at Cohoes, and now in the State geological collection at Albany—I discovered an abnormality in the absence of one of the molar teeth; but any one who is acquainted with the process of the eruption and shedding of the teeth of all of the genus *Elephas*, will readily understand that this may easily have been accidental).

It seems demonstrated that general structural imperfections of the teeth of man reach far back, and antedate the historical era. As the teeth of animals remain structurally perfect under all vicissitudes of alimentation,—whether rioting in plenty or barely existing in a state of semi-starvation, whether feeding upon the crude products of nature or living upon food prepared for them in a state of captivity,—and as the teeth of man are in general structurally imperfect under all circumstances of diet and habits of life, it cannot be that mere dietetic influences exercise any very important part in the development of the teeth, and therefore the prescribing of artificial foods, of the phosphates, etc., for the purpose of supplying lacking elements, is founded on a mistaken theory. If they act at all, it must be remedially.

A careful analysis of some of the foods supposed to be lacking in the phosphate elements that enter into the bones and teeth, finds an amount largely in excess of the needs of the system. Even supposing a pregnant woman to live solely upon the finest wheat flour, the amount that she would consume contains a much greater quantity than would suffice for her own wants and those of the fetus that she carries. It is a fact that pregnant women and rachitic children excrete the mineral elements largely, showing that under all circumstances it exists in excess in the food.

Considering all these facts, we must seek in functional disturb-

ances, in impaired digestion and assimilation, the cause for anatomical and histological imperfections in the teeth. But the record of these abnormalities (if they have not already become the normal condition) extends so far back that it demonstrates these functional divergences as inherent to the present condition of the human race. Whether in the long course of development of man in his present state from some lower order, or from some remote intellectual condition, the nervous organization—the brain,the intelligence—has been cultivated at the expense of the mere animal functions, it might be profitable for ethnologists to inquire. That the causes of the lack of perfect development in any part of the human system are in some way connected with non-assimilation, many considerations lead us to believe. That the habit of looking solely to the diet to find reasons for existing abnormalities is a search in the wrong direction, most thinking men will admit. It is time for dentists to take a broader view, and by a more careful study of function, by deeper physiological research, by the abandonment of specific treatment and a careful examination of all the factors that enter into the problem of existence, to endeavor to become physicians indeed, in the very broadest sense of the term.

The Etiology of Dental Caries.

It is indisputable that within the last five years more has been learned of the probable character of dental caries than during the whole previous history of the profession. The late discoveries of Koch, Pasteur, DuBois-Raymond, and others, in the pathology of zymotic diseases, have paved the way for investigations that have revealed the nature of many oral diseases.

Sir William Jenner was far in advance of his age when he discovered that inoculation with the vaccine matter from animals suffering with cow-pox was a protection from that dread scourge, small-pox. He had noticed the relation between the two diseases when but a student, because of the popular belief that the two were antagonistic. At length, after long study, he inoculated a boy about eight years old, on the 14th of May, 1796, with cow-pox matter, and subsequently with variolous matter, and, as he had predicted, small-pox did not ensue. But he was far from comprehending the true principles of this protection, and, until a recent period, vaccination for small-pox was but an empirical method, accidentally discovered. It was left for modern pathologists to demonstrate that all the so-called zymotic diseases, together with many others not

previously suspected as such, were due to certain microscopic organisms that multiplied with astonishing rapidity in the human system; that each one of these maladies had its specific organism, but that they were antagonistic to each other, and that when certain ones had been allowed to run their course they exhausted the ability of the body to nourish certain others. Physicians had always been aware that a patient who had once had small-pox was not liable to a second attack, except under circumstances and conditions that were very unusual. The studies and observations of Koch gave us a clearer insight into the character of those organisms, for he isolated some of them, and learned their life-history. Finally, Pasteur crowned the work with his immortal discoveries, and to-day we know that if a person be guarded against the intrusion of these microbes, the contagious diseases need no longer be feared. We have learned that the final dissolution of all nitrogenous substances is invariably brought about by the influence of micro-organisms, and Tyndall demonstrated that if they be excluded putrefaction and fermentation are effectually prevented.

Few, however, even in view of these discoveries, would have anticipated that any of these organisms might prove to exert an influence in the production of dental diseases. The theories concerning dental caries that had been entertained held that the disease was but a chemical solution of matter that must be considered inorganic. The fact that it was living, vital tissue was not considered, and caries was looked upon as a simple change of affinities, such as occurs in the chemist's retort.

In 1868 Drs. Leber and Rottenstein published their work on "Dental Caries and its causes," and in 1873 it was translated into English by Dr. T. H. Chandler, of Boston. In this they advanced the theory that the disease was mainly due to the influence of certain fungi of the mouth, the chief of which was *Leptothrix buccalis*. Long previously it had been discovered that vegetable organisms existed in the oral cavity, but comparatively little weight had been given to their presence, which was usually supposed to be accidental. Ficinus had averred that dental caries was sometimes due to infusorial animalculæ that produced a putrefaction of tooth-substance; to these he gave the name of *Denticolæ*. Klencke described a soft caries caused by putrefaction, as he called it (at present we know that caries is not produced by putrefactive, but by fermentative, organisms), and another due to a parasite that he called *Protococcus dentalis*. But these observers made little impression.

At the International Medical Congress, held in London in 1881, Drs. Underwood and Milles produced a joint paper, in which they attributed caries of the teeth to the direct action of micro-organisms which, penetrating the dentinal tubuli, destroyed the living substance of the tooth, leaving the inorganic matter to be broken down and washed away in the fluids of the mouth. This theory was accepted by many persons in this country, and is still vehemently urged by them.

In the laboratory of Carl Heitzmann, of New York, observations were conducted by him, and by Drs. Frank Abbott and C. F. W. Bödecker, and their conclusions were published to the world. Their theories necessarily rested upon the reticulated structure of protoplasm, as taught by Prof. Heitzmann. They held that caries was essentially due to an inflammatory condition of this reticulated vital matter, and that the course of the disease did not very materially differ from that of inflammation in other tissues.

In 1881, at Wiesbaden, in Germany, at a meeting of the American Dental Society of Europe, some of those present listened to a paper by a young dentist previously unknown to fame, except as the thoroughly educated son-in-law and coadjutor of the well-known Dr. F. P. Abbot, of Berlin. This was the first of a long series of papers since published by Dr. W. D. Miller, and it was the initial point of a course of experiments and observations such as were new to the history of dentistry. The results are before the profession, and they have placed their author in the very front rank of experimental observers. He proceeded scientifically and systematically to make an exhaustive study of his subject by cutting thousands of slides of diseased teeth. In these he found micro-organisms invariably present, so that he was enabled to deduce the rule that they were in some way essentially connected with caries of the teeth. Thus far Milles and Underwood had proceeded, and to this point his observations were corroborative of theirs. But he proceeded further, and endeavored to determine in just what way they were instrumental. He made pure cultures of these organisms and studied their life-history. He segregated a number of them, and was thus enabled to study them morphologically, physiologically, and chemically. He pursued these investigations perseveringly and unweariedly. On his late visit to this country he brought with him some of his pure cultures, and I have the pleasure of exhibiting a few of them to you now. It should be remembered that within these little tubes is contained the record of the most exhausting work, continued un-

remittingly for three years. So great was the difficulty that attended their production that it was a full year before he was able to segregate a single one of these organisms successfully.

He has demonstrated that caries of enamel is produced almost, if not entirely, by acids generated in the mouth; that caries of the dentine is largely, if not wholly, due to the action of micro-organisms, or ferments, that secrete or produce within the dentinal tubuli an acid that has the power to decalcify tooth-structure, and thus caries penetrates deeper and yet deeper within the body of the tooth, the decalcifying process preceding the actual presence of the organisms. By inoculating a culture fluid, or medium, with a certain definite organism, in an acid or neutral solution, he has succeeded in producing artificial caries that it is impossible to distinguish from that which occurs in the mouth. It is, possibly, unfortunate for him that he has not been fully comprehended by those who did not perceive the difference between putrefactive and fermentative organisms. It is only the latter that are active in the work of caries.

Perhaps I cannot better summarize the results that he has obtained than in his own words, at the close of his series of articles in the *Independent Practitioner*, July, 1884:

1. I convinced myself by the examination of some thousands of slides of carious dentine that micro-organisms were always present, and that they, without any doubt, were the cause of various anatomical changes which were found to take place in the structure of the dentine during caries. Of course, the question of priority does not suggest itself; Leber and Rottenstein, as is well known, were the first to give definite expression to this fact.

2. I proved, at the same time, that the invasion of the micro-organisms was not, in the majority of cases, simultaneous with the softening of the dentine, but that large areas of softened dentine could be found that contained no fungi. Of all those who examined my preparations in America, no one, whatever his theory, ever once denied this fact. I concluded from this that the softening of the dentine went in advance of the invasion of the organisms.

3. I determined, by analyses of masses of carious dentine sufficiently large to give reliable results, that the softening of the dentine is of the nature of a true decalcification; that the decalcification of the outer layers is almost complete, and diminishes in degree as we advance towards the normal dentine; furthermore, that the same relations maintain in dentine softened in a mixture of saliva and bread, or in weak organic acids; also, that in a mass of carious dentine the lime-salts had been removed to a much greater extent than the organic matter.

4. I maintained from the first that the softening of the dentine was produced by acids, for the most part generated in the mouth by fermentation. I had, however, no direct proof of this.

5. I *proved* that fungi exist in great numbers in the human saliva and in carious dentine, which have the power to produce acid under conditions which are constantly present in the human mouth. I determined this acid, for one of the fungi, at least, to be the ordinary ferment, lactic acid.

6. I produced caries artificially, which under the microscope cannot be distinguished from natural caries, by subjecting sound dentine to the action of these fungi in fermentable solutions.

7. I determined the influence of various antiseptics and filling-materials upon the fungi of caries.

8. I isolated various forms of these fungi, and determined *in part* the conditions most favorable to their development, their characteristic reaction upon gelatine, their physiological action, their effect when inoculated into the system of lower animals, and their possible connection with certain obscure diseases generally attributed to the carelessness of the dentist.

At the late meeting of the American Medical Association, held in Washington, May, 1884, before the Section of Dental and Oral Surgery, Dr. G. V. Black, of Jacksonville, Ill., a man whom we all honor, read a paper that presents some novel views of caries of the teeth. I have not seen the paper in full, and am not therefore prepared to give an intelligent *résumé* of his theories and deductions, but I am assured that he will shortly present to the world a work upon dental pathology, and for that every thinking man of the profession will look with interest and eagerness.

In conclusion, I desire to say that, while wonderful progress has been made during the past year, the task is far from being completed. Dr. Miller himself says that there are yet, in his opinion, many factors that have not been intelligently or exhaustively considered. He himself will shortly commence a new series of observations and experiments, for which his previous labors admirably fit him, and from which his profession and the world of science have much to hope. Other students, in various parts of the world, are engaged in careful study, and we may well believe that we have entered upon an era that will end in the acquisition of knowledge that will enable us more successfully to cope with the difficulties of dental practice.

DISCUSSIONS.

Dr. SPALDING: I would like to inquire whether Dr. Miller has made any pure cultures from the dental caries artificially produced?

Dr. BARRETT: That would be a work of supererogation. He produces dental caries from a single segregated pure culture, showing that there is one organism that produces caries.

Prof. Mayr: It seems to me that the apparent difference between the views of Dr. Miller and those of some of the first defenders of the septic theory in this country has been much exaggerated, thereby causing many to consider the whole subject as more doubtful than it is. This difference depends entirely upon what we call decay. You look into the mouth of the patient who complains of a decayed tooth. There is the smell of decay, there is pain. Now, the smell is not the decay, and the pain is not the decay. You take an instrument and dig around a little. After you have removed the outer mass of decayed matter, I do not think you have yet touched the point of disease. You must go down deeper. After you have excavated deeper, the patient begins to twitch. Now, I presume you have reached the point where you can begin properly to say that you have touched the decay. You excavate further, and the patient becomes happy again. It seems to me that in doing that you have gone through the decay; the decay was something between the mass which was first encountered and the healthy tissue of the tooth. I think all our dispute is because we fail to realize this precise point. The outer mass found in the cavity is not decay; we agree on that. And, when we get through to the healthy tooth again, we recognize that this is not decay; but there seems to be a dispute as to the intermediate point. What is this intermediate point? Is it merely decalcified dentine that we meet with in that particular spot?

Dr. Atkinson: Do you mean decalcified or dissolved?

Prof. Mayr: I say decalcified, because almost everybody speaks in this way. Is this really decalcified dentine? is it simply a different form of the tooth, or is it an entirely new production? The real line of disease is probably not a thousandth of an inch thick; the real diseased layer can certainly be fixed within a microscopically small territory: and we will never agree if we do not establish exactly our fighting ground. It seems to me that this is the only point of difference. Dr. Miller seems to me to be talking and experimenting altogether too much about the outer mass found in the cavity. This is of no particular interest; it is the corpse of a tooth. The point of interest is the thin layer where the physiological changes are going on.

We in this country have been experimenting and working, too, upon this subject, as well as Dr. Miller, although perhaps not with the same facilities. Dr. Miller has the one hundred professors, the fine microscopes, etc., of the University at Berlin at his disposal,

but I think some of the honor for what has been accomplished should remain in this country. I think it would be unfair to those who have labored in this country to so completely overshadow and silence them as it seems to me has been attempted. I do not say this for any personal reason, for I have no possible personal interest in it. A number of experiments have been made by investigators in this country, and, as I said before, the only point of difference between them and Dr. Miller seems to be in what each conceives decay to be. About three years ago, also, I made careful analyses of this diseased layer between the corpse or outer mass of débris and the healthy dentine. I was very careful in my work, and, though I had taken a mass of decaying matter which was only one seventeenth of a grain in weight, I was sure of my results; and in this thin layer there was no diminution of the lime-salts. There was no doubt about it. Therefore, whatever may be true of the outer mass, as to that particular layer about which we are fighting, I have a conviction, and an honest conviction, based upon my personal investigations, that, at the real point of decay, there is no appreciable loss of the lime-salts. The process of decay at this point is a physiological process,—some may say a pathological process; but that depends only on the view you take, for physiology and pathology comprise the same processes, only the first are in our favor and the latter against us: hence a subjective difference of no value. This process is, to my conception, a physiological one, and, therefore, to say that we have settled it by saying decay is due to fermentation from without seems to me to be very reckless. I would rather say that this precise phenomenon which we call the process of decay is still in the realm of physiological processes, and is not yet definitely settled.

Dr. Atkinson: I rejoice with exceeding great joy that we have at last come to a point, and that point is the initiation of the action that is nominated decay. Where does that occur? We have just heard from my learned and beloved friend. He said one word that, were it written in deep lineaments upon all our consciousness, would be a talisman to deliver us from all evil of investigation. That is, to have one definition, one term expressive of one process, and then we would not be so tangled up, and have to deal so ambiguously with questions that clearly come before the mind, but that cannot be brought to be revealed to the senses. The products of a process, as the last speaker has learnedly and clearly shown, are not the process itself. The tracks of the game would make a poor dinner.

You may show the track of the buffalo to the hunter, and it may be never so fresh and capable of being followed by the instinct of the dog or the sharp eye of the animal that is after the buffalo, but the tracks themselves would make a poor dinner. Just such dinners have we been invited to by those who claim that the germ theory —and they use the word theory in the sense of speculation only— by those who claim that the germ theory is demonstrated to the exclusion of physiological processes. I commend the last speaker with my heartiest congratulations, and I wish to express to the author of the paper which has been read my deepest affection and mental recognition of the clear delineation of his comprehension of the subject before us, as presented by him. What is a process? It is a going on of something to something. What is a thing? It is a mental concept formulated. It is a think formulated and defined; a distinctly perceived thought. I thank you for saying that pathology is only perverted physiology. The function of building a tooth is the evolution of all its parts. The function of decay of the tooth is a perversion of the currents of energy. Therefore, decay is the reversing of a current. What is that current which we nominate a nutrient current but an evolutionary current—a building-up of the elements that constitute the tissues that we are dealing with? And we are now dealing specifically with enamel and dentine. The action of these currents is in obedience to what I have been much abused for calling a typal order. The typal order of the enamel is a modified typal order of the dentine. The influence of the lime-salts is similar, and we see a harmony in the protoplasmic lines, showing that it is really a living tissue that has to be nourished to be kept in proper condition. It is that nourishment that we are talking about. I have just said that decay was a perversity of a nutrient current, of a nutrient activity. What are lines of nutrient activity? They are courses through which the blessed light of heaven, plus energy, go to organize teeth and other parts of this wonderful system of ours, which we dissect so as to get at their anatomy.

My friend persisted in saying "decalcification," when I asked him about it. He did not mean that at all. God bless you, my friend, for saying there was no appreciable difference in the amount of lime-salts of the tissue taken from the dominion of decay, that it was exactly like healthy tissue in that the equivalents were there in their exactness.

What is it which takes place when a fellow comes into your house

to court your wife and take you away from her, or her from you? He has no effect at all until he can pervert her currents of affection; and then good-bye to peace in that house. That is exactly what goes on in the components of the tooth. You don't see the point, but I will tell you in a minute. When the combination between the husband and the wife is taken away, then you can get a divorce much more easily. What is the corresponding combination here in the tooth that we are talking about? The stiffness is caused by the hardness of the lime-salts in the relation that we call the basis-substance of the dentine. Are there any bacteria there? Who of us have seen any bacteria there? Observers have never seen any in the intermediate basal substance, which is nothing but lime caught in the meshes of the glue; that is the enamel basis. We find the attacks on the structure of the tooth taking place in this basal substance; softening of the tubules going up the fibrillæ. And yet you find no bacteria there.

I do not pretend to say what the process is that is now being revealed to us, or near the revelation of which we are, as to the proliferation of these so-called micro-organisms; but I have this to say, from the depths of my affection, from the best action of brain and my profoundest conciousness, that they are not seen by us by the highest power of amplification and concentration of light that we have yet had. The ghost of the bacterium is the first thing, before the bacterium can take conformation; or else you could not differentiate that. When we can catch the ghosts and get the form and specificity of the ghosts, we can reach the beginnings; but when we can only take those after they have been ripened by reason of the presence of the ghostly inhabitants we shall be dealing only with the tracks of the game, and we shall not have a very satisfactory dinner. That is the kind of a feast we have been having for years. Let us hold fast to the truth as we have it, and strive for more light and more proof. We want, in our own mental ratiocination, to get at the demonstration of truth and reveal it to all the world. When we have an object under the microscope, let us carefully note all that it reveals, whether it sustains our preconceived view or not. Let us not be led astray by any argument that because some one else has not seen something, therefore it cannot be seen. As has been said with regard to these nutrient currents, they are so fine and so spirituelle that the natural mind, the ordinary perception, cannot see them, until it is converted. Now, in our mental processes we have just to return to the embryonic condition; we

have to assume that we are novitiates before we can progress. I would rather take five boys, fifteen years of age, who had simply an English education, and agree to make them good anatomists, physiologists and pathologists, therapeutists and operators, in the succeeding five years, than to take five graduates and agree to make them first class men in the same time. Do you know why? Simply because there would not be so much error to combat.

Let us encourage the men who are making these investigations, until they shall bring all out so clearly that he who runs may read.

Dr. SPALDING: I have long held the opinion that there is no pathological science except as it is preceded by physiological science; that there is no pathology, *per se*. There are no such things as pathological functions. There are no such things as pathological growths, *per se*. The processes are all physiological processes inverted or perverted, and the growths are physiological growths out of place. I know that we do not much understand, first, the science of physiology, and second, the science of pathology; hence I arise at this time to set forth these particular views, that we may get a clearer apprehension of what we are studying. The study of physiology should precede that of pathology, for how can we comprehend the condition of disease unless we first know that which constitutes health? In the unfolding of medical science physiological knowledge has ever opened the way to a knowledge of pathology; hence, a cellular physiology rendered the theory of a cellular pathology possible. Our text-books are full of descriptions of pathological anatomy, of pathological growths, and of pathological processes, when, as Dr. Atkinson has well remarked, there are really no such things; but they are simply inversions of true physiological forces, which produce results which are called pathological. I only wished a little more forcibly to bring out the idea which was alluded to by Dr. Atkinson.

Dr. BARRETT: We came here not to study ghosts, but material things. The question that is presented for our consideration is not that of the tracks of the game at all, but the game itself; and we wish to get down to the actuality of it. Concerning the pathology and etiology of dental caries, until within a comparatively short time, we have not arrived at anything definite. It has been demonstrated, within a few years, that micro-organisms play a much more important part in the universe than had been suspected. No one would have dreamed that they could be considered as important factors in dental caries, until within a very short period of

time. Leber and Rottenstein demonstrated the existence of a fungus in the mouth; but we are not speaking of animal bacteria. The fungi of dental caries are of a vegetable nature. They do not exist at the same time as, nor in conjunction with, putrefaction. Milles and Underwood made certain observations in which they undertook to follow the lead of Dr. Miller, and re-performed the experiments upon which he had based certain conclusions. They made this statement, —that they prepared cultures, and kept them under the conditions which he stated until they became so offensive as to preclude the possibility of further observation. They had *putrefactive* organisms present, and consequently could not produce artificial caries. There was something lacking. They did not obtain the same conditions that Dr. Miller produced, and which he had stated were absolutely essential to the production of artificial caries. I would not detract from the credit that is due Milles and Underwood or any other gentlemen. The American school of observers have dived as deeply into that matter as anyone else.

Dr. Miller has not identified himself with the German school, nor with any other, except the American school; consequently, when we look upon him as a foreigner, or as pursuing German methods, or when gentlemen say that he is following the instructions of the German schools, they could not be further off in their speculations.

The chief point upon which all this discussion rests, so far as Dr. Miller goes, is the fact, as I stated, that caries is produced or accompanied by fermentative organisms. Dr. Miller has performed a great many of these experiments.

Prof. Mayr is a man whom we all honor, and we all appreciate the work that he has done. But where Prof. Mayr has made one analysis of decalcified dentine, Dr. Miller has made fifty. Prof. Mayr has made his analyses with the utmost care. Dr. Miller has done the same. Prof. Mayr has done it in the solitude of his laboratory. Dr. Miller has worked with the co-operation of, and his work has been submitted to, men like Koch, DuBois-Raymond, and others, the first histologists of the world. And some of the results obtained by these gentlemen are directly antagonistic to those obtained by Prof. Mayr, and must be proved or disproved by the corroborating circumstances, or by other observations. It is not for you or for me, who have made none of these observations, to pronounce between the two. It is only for us to say which seems the more reasonable.

[At this point Dr. Atkinson rose and addressed the Chair, for the

purpose of obtaining the floor. Dr. Barrett refused to yield, and continued :]

I desire to present my own stand-point on this matter, and to state my belief in regard to it. Roughly stated, the process is something like this: The organisms in dental caries are fermentative organisms. We have present in the mouth at all times conditions favorable to their growth. We have moisture and sugar. If we have not sugar, we have starch, which is easily transformed into it. The first process, according to Dr. Miller's theory, will be the decalcification of the superficial portion of the enamel. In decay of the enamel itself it is pretty clearly demonstrated that micro-organisms cannot play any important part. But after the decalcification of the enamel comes decalcification of the dentine. The lime-salts are removed, so that it becomes a spongy mass, which takes up the saccharine fluids of the mouth that are favorable to the development of fermentative fungi, which there go through their life's history. In the course of their existence they produce or excrete an acid, of which Dr. Miller has made a careful analysis, and finds it to be lactic acid. The lactic acid which is there formed continues the work of decalcification in advance, leaving the vital, organic portion of the teeth for the further development of the organisms. They in turn excrete or secrete a further production of acid, which continues the process of decalcification, and so the process is extended indefinitely; and this is progressive caries. Dr. Miller's views are founded not upon theorizations, and were derived not from his books, but they were developed through his microscope in his laboratory, and are based upon actual observations, thousands upon thousands of which have been made.

Dr. Abbott: Dr. Barrett has said that we are dealing with actualities and not with ghosts. I think I understand what is meant by ghosts in this connection: something which we have not been able as yet to discern, either with the naked eye or with the strongest powers of the microscope. Does this put us in the position to conclude that there is nothing beyond what we can now discern? Is there nothing yet left to be found out, or to be discovered? Is it possible that we are not going to have powers of the microscope that will reveal to us things of which we have to-day no conception at all? How was it forty, thirty, or even twenty years ago? Have we not been every year discovering ghosts? Are we not at this very moment at work investigating and endeavoring to unearth the very ghosts that he is talking about? My friend, large as he may ap-

pear before you now, was once nothing but a ghost, and a very little one, too; so that it required a pretty strong power of the microscope to discover him; or would have done so if anyone had been looking for him. We can carry the idea on indefinitely,—so far that it seems almost beyond the conception of man,—*the minutiæ of things yet to be discovered.* It is only a few years ago that a microscope which would multiply five hundred times was something wonderful. This instrument has brought to view things the existence of which had not been dreamed of,—minute organisms which are becoming daily more and more important in the world of science. I have no doubt that floating in the air here to-day are millions and millions of ghosts which would become organisms if they were placed in the proper condition to become developed.

Speaking of caries, it is probably known to the most of you that the tooth consists of quite a little measure of organic material. Nearly one third of the structure of the dentine of a tooth, either in weight or in bulk, whichever it may be, consists of organic matter. At all events there is enough organic matter to form a framework into which the lime-salts are deposited, which results in the formation of what is known as the dentine. Apparently, the results of Dr. Miller's investigations show that certain organisms are found in the mouth. We never denied that. He claims that there is a certain acid in connection with caries. We admit that there is. But when he claims that fermentative organisms are producing the acid which brings about a dissolution of a certain amount of the lime-salts, another question is raised. Dr. Barrett says nothing about one important matter; he would have us understand that these or-organisms leave behind the organic portion of the tooth after they have made a certain amount of progress. He says they excrete a certain acid, which he has determined to be lactic acid. That goes on and dissolves the lime-salts; but he mentions nothing in reference to any life in the organ. Is it possible for anyone of you to arrive at the conclusion that there is no life in the tooth? Is it possible for you to arrive at the conclusion that there is not life in the organism anywhere? You might as well deny it in the one case as in the other. Now, if there is living matter, if there is matter that is subject to irritation,—and I believe every one of you can testify to that,—then it must be subject to an inflammatory process, which is certainly taking place in the tooth after caries has once begun. How can it possibly be otherwise? So the process in the deeper portion of a carious tooth must be an inflammatory one, just as much as absorp-

tion of the roots of the temporary teeth is an inflammatory process; just as much as absorption of bone is an inflammatory process. It does not seem to me possible to account for certain conditions in any other way.

My own idea is that exactly the same process takes place in caries that occurs in the absorption of the roots of the temporary teeth,—that is, in the deeper portion,—the difference being simply in the irritant. You have a living portion of the tooth that has become irritated. The lime-salts are broken down through this irritation. I think Prof. Mayr's experiments have shown that acid is not found in the deeper portion of a carious tooth. Dr. Miller's own preparations that have been exhibited in this country do not show organisms penetrating to the depth of the disturbed or partially broken-down tissue of the carious tooth. I cannot conceive that it is possible to have a destruction of the tooth, in the deeper-seated portions of the disease, in any other way than by an inflammatory condition, which must follow always when living tissue is subjected to irritation.

Dr. Atkinson: These different men say enamel is decayed by the presence of an acid generated in the mouth. Am I right? Is not that the sum of what they have said? I know it is, whether you know it or not. If you don't know it, it is so much the worse for you. We can destroy teeth by introducing acid from outside of the mouth; but it has not yet been proved that there is a specific acid generated in the mouth by a specific antecedent organism. That is guess-work thus far. I don't say it is not true; but I wish to justify the position that I take as an earnest seeker after truth. If that is so, then there must be a process of generation of these acid-makers in the mouth and continuing to a greater depth than to the first degree of satisfaction of the bonds of the affinities between the acid and the organized substance of the tooth. It is conceded that these acids do not attack the enamel fibres.

Now, there is a great deal more nonsense about the difference between putrefaction and fermentation than appears on the face of it. There are points of mergence, and there are points of divergence; but it has not been proved that a decomposition can take place without having what is called an acid or an alkali preceding it: and if you know enough of chemistry to understand that there is only a distinction of equivalency, of one or two bonds of affinity between an acid and an alkali,—that the elements may be the same, only combined differently, when we call one an acid and the other an alkali,—you will see

what nonsense it is to talk of acids and alkalies as if they were eternal opposites.

Dr. Peirce: I listened with a great deal of interest to the report from Section VII., and all the time felt sorry that Dr. Miller was not here that he might be his own representative. I have read all his writings that have been published in this country, as well as those of other friends on this side of the water; and I have watched, month after month, to see what change was taking place in the minds of these men; and I felt, in listening to the report of the chairman of the Section, that he did not fully understand the position that to-day is occupied by Dr. Miller. If you will pardon me, I will read an extract or two to show you Dr. Miller's views at the present time. You will see that he stands precisely where Prof. Mayr stands, and where Dr. Atkinson and other experimenters in this country stand. In his last publication, after recounting his various experiments, he says:

"Although I have now, as I think will be granted, established upon a sure basis the fact that caries of the teeth may result directly from the action of acid-producing fungi in the presence of fermentable carbo-hydrates, the conclusion would hardly be justifiable that, by keeping the mouth constantly and perfectly free from all fermentable substances, or by repeated application of antacids or antiseptics to all parts of the teeth, or by all these means together, we could banish dental caries from the oral cavity."

"A most powerful influence, which we do not understand, is exerted by the nutritive processes in the teeth themselves."

In another paragraph he says:

"I am assured by men who have grown old in the practice of dentistry that mouths which have long been under their observation, and which practically have been completely free from caries for years, at once, on account of some sudden change of health, show a general breaking-down or crumbling of the teeth *en masse*, in the space of a few weeks. We have here a cause which lies without the domain of both bacteria and acids."

Those are two paragraphs which I would like to have go into our Transactions, to show the conclusions Dr. Miller has reached to-day. I admit that these views are different from some that he has expressed, but he has grown by virtue of his experiments. He is not in advance of our American experimenters, but he has come up to them.

Now, this subject is one in which I have long been interested; and I think we may draw some conclusions, or rather strengthen

our conclusions, from some facts outside of the mouth. Those of you who have been interested in what is known as the "potato rot," and other diseases affecting vegetable products, know that where potato rot has been general, it has been during a season when there was some defect in the development or growth of the potato. Some years ago, when I was a boy, I remember thousands and thousands of bushels of potatoes were placed in the cellars, which in a few weeks had to be thrown away. During the season of growth there was a long drought, and then a warm rain, and the potatoes, after having been checked in their growth, grew again rapidly, so that we had in the potato, as placed in the cellar, a want of continuity in its development, and necessarily in its structure. The germs which it is claimed produce this potato rot are no doubt present every year; but there was a condition that offered a ready pabulum and habitat for their development: hence the result. That is one point.

Next, take the "rust" of wheat. Any year, if any of you will go into the granaries, you will find on the wheat grains a microscopic speck. It is there every year. Now, the wheat grows; and just as the head is perfecting, there comes a succession of damp, cloudy mornings and heavy fogs for a week or two. Every farmer says, "My wheat will rust this year." Why does it rust? Not because the germ is there this year more than any other year, but because the condition of the atmosphere accompanying the growth is favorable to the development of the germ. It first develops inside of the straw, then works its way to the surface, and the whole straw is affected, and the nourishment of the head is cut off. So we have a short wheat crop, by virtue of the rust and smut that are the result of this germ that is present under conditions which favor its development.

I might also prove that the germs which affect our peas and various vegetables in the garden develop on the same principle. For, while the germs are omnipresent, their development is the result of favorable but accidental conditions. I mention this, because I think it gives some illustration of the conditions that we find in the mouth.

We have been for some years talking about the low forms of life producing caries, and have come to the conclusion that they do produce it, because we have found, in the broken-down tissue which fills up the cavity after the tooth is decayed, these living germs. We can all recall to mind many cases where the teeth have rapidly decayed, and then, without the aid of the dentist, decay has ceased.

Yet in the same cavities, all the time, have been the leptothrix and bacteria, and all the forms of life that we find in the cavity when decay is going on; showing that, notwithstanding their presence, the progress of decay is stayed.

Dr. Barrett: Dr. Peirce does not regret more than I do the fact that Dr. Miller could not be present and personally report what he has done. I may have an erroneous conception of what he has done, and the conclusions he has reached. Certainly it is widely different from that of Dr. Peirce, who seems to understand Dr. Miller as asserting, or his observations as proving, that micro-organisms are simply *incidental* to dental caries. Now, Dr. Miller asserts directly the contrary. It seems to me that anyone who reads him intelligently can get no other conception than that he asserts that they do have an active influence in the production of dental caries; not that they are simply scavengers feeding upon diseased territory. He states distinctly and clearly that there are many factors in the production of dental caries. Some of them he knows, and some of them are unknown. There are other heights to climb before we peer from the summit and view the end. But that micro-organisms are simply incidental to dental caries,—a theory which has been urged by certain observers,—is entirely foreign to the conclusions reached by Dr. Miller. None of the observations which he has made have proved that; nor would he, for a moment, I think, assent to such interpretation of what he has written and said.

Dr. Atkinson: Let us try and discriminate just how far we have gone into this matter, and see how thoroughly we apprehend the laws that we are dealing with in striving to get at the etiology of dental caries. If all the organisms that are found in the presence of dental caries are also found in the absence of dental caries, then we must assume that there is some sort of energy that has to be present to awaken the activity by which the caries is produced; and, ergo, they are not the initiative of the actualities. Is that a clear, logical proposition, or not?

Dr. Peirce: That is so.

Dr. Atkinson: Then I am justified in saying that the thing which I called a ghost, the unseen current of nutrient activity, is the first stage of movement that initiates the unbuilding of the tissues by process of decay. What is the use of arguing that twice two are four?

Dr. Peirce: From some of the remarks made by Dr. Barrett I am afraid he thinks I used my own language. I simply read a quo-

tation from Dr. Miller's book, showing what conclusions he has drawn.

Dr. SEARLE: I have had occasion to look at Dr. Miller's paper somewhat critically, and I think I understand his position. He says, whether in the paper cited by Peirce or not I am not certain, that the lime-salts and the basis-substance are chemically united to form dentine. He says they are chemically united by vital forces, and that the same vital force which originally unites them, is able, under circumstances of ill-health, to disunite them.

Dr. PEIRCE: He uses the phrase, "breaking-up the continuity;" says that the continuity is disturbed.

Dr. SEARLE: The point is that he claims that the negative power exerted during certain conditions of ill-health is able to dissolve that which the vital force has put together. This is all the recognition he makes, so far as I recollect, of any vital action in the dissolution of the lime-salts.

Unless he has written a paper later than any I have seen, he does not recognize any vital action of the living matter in producing the decalcification of the dentine, or, as he calls it, the breaking-up of the bond of union between the basis-substance and the lime-salts, nor has he recognized any vital action of the micro-organisms in directly attacking the living tissue of the dentine or particles of bioplasm. This is the point of disagreement between him and Underwood and Milles.

Dr. CLARK: I do not like to say anything reflecting on the investigations of Dr. Miller, for he has done some good work, and is entitled to our thanks. But when other earnest investigators in this country, whose efforts have been just as honest and their results more accurate and beneficial, are entirely ignored,—and there has *been all along* and *still is a studied effort* to keep such names in the background, so that the lustre of one name—that of Dr. Miller—may be more apparent,—when one feels and *knows* this is being done, it is hard to keep quiet. I hate to blow my own trumpet as much as any man, but not being blessed as Dr. Miller in this respect, I am forced to the disagreeable necessity.

The first known, in this country, of bacteria in connection with caries of the teeth was from a paper read by myself, at Charleston, S. C., about twenty years ago. Some twelve years after this I read another paper at the Springfield meeting, and some time after this another before the Odontological Society of New York, and one or two before the New York Microscopical Society. In some of these

papers I did not say much, because the subject was new and little was known, but considerable underbrush was cleared away, and a new road opened up which has been ably followed and improved by the investigations of Dr. Stockwell, Prof. Mayr, and many others, who have had no occasion as yet to *change their course or correct their views*. Therefore, I wish to remind Dr. Barrett that Dr. Miller is not the *alpha* and *omega* of the germ theory of caries, at least not in this country. He has come into the road after it was cleared of many obstructions, has done good work, deserves praise, and I am as ready and willing as any man here to give it; but when, as said before, this is sought to be gained unfairly and by the sacrifice of other co-workers, then I say it is hard to keep quiet. I must urge a veto.

Again, in many respects, Dr. Miller's claims, as represented by Dr. Barrett, will not bear crucial investigation. Here, at my place in Saratoga, as many of you know, about four months of the year is taken up with microscopical research. I have tried hard to see things as Dr. Miller sees them, and to make my experiments agree with his, but in many respects find it impossible.

When I see these little bottles brought here, and am informed that the liquids were sterilized, and hear sterilization referred to as an easy, simple thing, I am forced to the conclusion that either Dr. Barrett or Dr. Miller does not appreciate the difficulties and uncertainties of the operation. It is easy to sterilize a liquid, but hermetically sealing it free of air-germs and retaining it in this condition is quite a different thing. This has been abundantly proved by the experiments of Huxley, Tyndall, and every microscopical investigator of any note. Say the water in this glass in my hand is sterilized; how are you going to bottle it free of germs, when the air is fifty per cent. organic? One germ on the glass, water, or cotton-wool is enough to increase to myriads in no time. Therefore, it is no easy task to close in a vessel any liquid without contamination. In the last few numbers of the *New England Journal* I showed pretty conclusively wherein Dr. Miller's sterilization was faulty. Therefore, in such intricate researches, it is safer to receive the investigations of anyone with considerable allowance, and, unless they bear the tests of others equally competent, they should be thrown aside.

The mooted question between Dr. Miller and myself is this: He contends that caries is produced by acids manufactured in the tubes of the dentine by bacteria, and that these organisms have the power to force the acid thus produced ahead, so as to act on the lime-salts, thus

enabling the organisms to follow. I claim that bacteria are brought into existence within the oral cavity by fermentation through air-germs, and that they enter the tubules or mesh-work of the dentine, absorb the bioplasm or life-substance in the tubules, leaving the lifeless lime-salts in a powdered or disintegrated state, which we call decay. It is impossible to account for their presence and propagation in the mesh-work of the dentine in any other way. It is true that through fermentation these organisms produce an acid, but to believe that they *eat* or *absorb the acid* thus produced, and then *inject it ahead to break down the lime-walls, requires more faith than reason.* We must explain the presence of these organisms in the tubules, what they are doing there, and how they subsist and propagate. This cannot be done on the Miller theory; but all becomes reasonable when viewed in the light which the germ men have earnestly represented.

As to pyorrhœa alveolaris, two or three gentlemen here struck the keynote as to cause and treatment. The disease, like that of caries, being of germ origin, of course antiseptic treatment is the only rational one. When we consider, according to the germ theory, that there is a continual fight between normal life-cells and disease organisms, it is easy to see how a little aid to either side will win the fight.

Dr. Daboll: One of the charms of the paper that we listened to last night, in connection with the demonstrations on the screen, was the successive steps that the speaker took to prove that the previous steps taken were correct, making the proof as he went along. That is a characteristic of Dr. Miller's methods: he proves his previous work, stopping at almost every step to show that the previous one was not an error. Dr. Miller not only has satisfied himself that caries is the result of fermentative fungi, but he has produced caries in teeth out of the mouth. I have seen the teeth in question. He takes a certain pure culture of fungi, places it on a tooth out of the mouth, without supplying the food necessary to produce fermentation, and no decay results. He takes another culture of the same organism, feeds it in the way necessary to cause fermentation, and produces caries. Now, if that is not proof enough that Dr. Miller is correct in his observations, I do not know what more we can demand. He does not claim that bacteria are not present, or that micro-organisms are not present, but he claims that it is the pure culture of the fungi that produces caries: that in the débris of decay we will find micro-organisms, which are the results more of putrefaction, but that the territory of active decay is occupied almost entirely by the pure

fungi. I asked him pointedly in regard to that, to get an idea of what he meant. I am not aware that any other investigator has produced caries out of the mouth.

Dr. FRIEDRICHS: Magitot.

Dr. DABOLL: I am not aware that he has done it. Of course, a man can immerse teeth in a fluid which will produce a breaking-down of the teeth generally; but to produce a regular cavity is a different thing.

Dr. CLARK: Did you see that production?

Dr. DABOLL: Yes, sir.

Dr. CLARK: Where did the tooth come from, and how long had it been out of the mouth?

Dr. DABOLL: It had been out of the mouth for a long time. It took him quite a while to produce a large cavity in a molar. He also exposed another tooth to the action of the fungi, without feeding them sugar, and produced no effect whatever. The moment that the sugar was given to the fungi, caries commenced immediately, and the breaking-down of the tissues proceeded. I think one of the difficulties that has been experienced by other observers is that they have not distinguished between putrefaction and fermentation. Putrefaction is one thing; fermentation is another. Miller shows conclusively that it is fermentation which produces breaking-down of the tooth-tissue, and to that end takes the pure culture of the fungi, and by feeding sugar produces decay.

Dr. CLARK: If Dr. Miller was questioned as to the so-called artificial caries claimed to have been produced, I think it would be found that the teeth experimented on were of recent extraction, or those in which there was bioplasm, or pabulum. If all animal matter is absent and nothing but lime-salts left, there will be little or no bacterial action, and the caries will be very different from that on the teeth in the mouth. The conditions of teeth in and out of the mouth are so many and various, that unless we are extremely careful we will be deceived and led into error. I am therefore inclined to believe it was animal tissue or pabulum in the mesh-work of the dentine that acted as the factor in the production of the so-called artificial caries.

As it is impossible to produce all the conditions affecting the teeth out of the mouth which we find operating on them in it, it is therefore questionable if the same caries can be produced. I know very well a certain kind of caries can be brought about by artificial means, but when critically examined it will be found a very bogus imita-

tion. Therefore, as stated before, all experiments of this nature can only be decided by the crucial tests of competent co-workers.

Dr. Daboll: I will say, in answer to Dr. Clark's question, that I think the tooth had been out of the mouth two years.

Dr. Clark: Does Dr. Miller claim to be original in producing this culture?

Dr. Daboll: No, sir. He has had the advantages of the best laboratories.

Dr. Clark: That ought to be stated, because I have seen the same things before.

Dr. Daboll: We have a society of microscopists in Buffalo, and they wished to meet Dr. Miller and get some points in regard to producing pure fungi. I suppose they thought they were going to be able to do it at once. Dr. Miller explained how he did it, and then said,—"Gentlemen, you must not be disappointed if you don't succeed the first time, for it took me two years to get it."

Dr. Searle: I have heard it stated several times here that fermentation and putrefaction were entirely different processes. If this is so, very good authorities have deceived me. I understand putrefaction to be the fermentation of albuminoid substances. I understand fermentation, strictly speaking, to be the change or breaking-up of carbonates,—substances like sugar. I understand that both processes are going on simultaneously in the destruction of the tooth; both sets of organisms are at work,—those which act upon albuminoid substances, and those which act upon carbonaceous substances. If Dr. Miller has succeeded in separating these organisms, he certainly has produced conditions which do not exist in the mouth. It took him two years, we are told, to separate those organisms that are found in the dentine. Dr. Miller has not produced all the conditions in any of his experiments which are present in the living tooth. Therefore I think they are unreliable. Underwood and Milles, in 1877, undertook their investigations, single-handed and alone, pursued their work patiently for four years, and made their report before the International Medical Congress in London, in 1881. I think Dr. Miller was present and heard that paper. Dr. Miller immediately commenced a series of very rapid investigations, and his papers began to pour out like newspapers from a printing-press. He has from the first ignored the reliability of the work of Underwood and Milles, and yet, practically, has added nothing to their discoveries.

Dr. Friedrichs: Will you allow me to correct one word? I think you cannot have read all of Dr. Miller's articles, because I remem-

ber distinctly where he mentions the work of Underwood and Milles, and shows how far they had progressed, and that he had also tried the same experiments they had tried.

Dr. SEARLE: Perhaps I used the wrong words when I said he had ignored them entirely. I meant that he ignored the reliability of their work. Underwood and Milles are deserving of credit for the work they have done in this direction, and when Dr. Miller undertook to deprive them of it, and pass them over by saying, "Priority is not to be mentioned in this matter," I felt justified in thinking that he was trying to aggrandize himself at the expense of some one else. I do not like that spirit. Give every man his due. I certainly am disposed to do him justice. I am sorry that I feel obliged in justice to my convictions to take the position I have with reference to what I understand Dr. Miller's attitude to be.

Dr. DABOLL: I want to say that I do not see how anyone can speak of Dr. Miller as the last gentleman has done. He is the last person in the world to seek to aggrandize himself at the expense of anyone. If you could see him and talk with him, that idea would be dispelled forever. He gives credit to everybody who has done anything in the same line of investigation. He simply claims that he has arrived at a result at which they have not arrived. When gentlemen say, "I don't see how Dr. Miller can produce these things; therefore I don't believe it," I consider that a very negative sort of argument.

Dr. SEARLE: I wish to correct Dr. Daboll. I said I did not see how he could produce the conditions that were present in the mouth; not how he had produced the results which he had, under other conditions.

Dr. DABOLL: Dr. Miller does explain the difference between fermentation and putrefaction. We have putrefaction in the same cavity with fermentation, but we do not have it in the periphery of the cavity; the periphery of the cavity is occupied by the fungi.

Dr. SEARLE: That is just what I say, that fermentation and putrefaction are going on in the same cavity, one in the carbonaceous, the other in the nitrogenous matter.

Dr. SHEPARD: This discussion is, it seems to me, entirely personal, and I object to its going on in this vein.

Dr. BARRETT: That is the very point I desire to make myself. These men who are not acquainted with Dr. Miller and who have—

Dr. SHEPARD: I rise to a point of order. This discussion must not be personal, but with regard to science.

The PRESIDENT: If Dr. Barrett has anything to say that is not personal, we will hear him.

Dr. BARRETT: If you had allowed me to finish the sentence, I would have said to you that we should bring the personality of no man into such a discussion as this. Nothing could be more foreign to the desires and wishes of anyone who is connected in any way with these observations, I am sure, than that personalities should be brought into it. We desire simply to discuss and determine the scientific problems that are to be or that have been solved. As regards the observations of Milles and Underwood, full credit is given to them. They worked up to a certain point. They determined the presence of micro-organisms in the teeth. But for a description of them, for a determination of the physiology and chemistry and life-history of them, another observer has been obliged to take up the work where they left it. The question is, is it necessary that we should have a knowledge of the physiology and chemistry of these organisms, in order to have a full understanding of the subject? I believe that it is, and consequently I believe this matter should be fully taken into consideration. Perhaps it is not necessary for a man to go through some of these experiments himself; but mere theorizations and speculations will not answer. It is necessary to perform some of these experiments before one can speak upon methods. I cannot speak upon methods, because I have not pursued them. I must take the results of other observers when they have laid their processes before me. I believe them to be honest men, and we must all accept their results, unless we go over the ground ourselves. No man who depends upon mere speculation, no man who has formulated his opinions from *a priori* reasoning, has the moral or scientific right to call in question the definite conclusions of competent experimenters and observers who get their knowledge at first hand.

Dr. R. FINLEY HUNT: I do not rise to continue this discussion, but to call attention to the remarks of the chairman of the Section on Physiology, in which he spoke of the factors in the consideration of this subject, and I hope that the circumstances of the last year will not again prevent Section VII. from bringing in a report which will give attention to these other points. And I hope that all the members of the Association will consider those points in the meantime, so that they can come prepared to criticize and judge of the views that are presented on that occasion.

SECTION I.

Prosthetic Dentistry, Chemistry, and Metallurgy.

Report by W. H. TRUEMAN, Chairman.

THE first subject embraced in our Section is artificial dentistry, or, as it is more generally termed of late, prosthetic dentistry. The latter term, while being more esthetic and *perhaps* more scientific, seems to cover that branch of our specialty better, and conveys a clearer idea of it as it is now practiced than did the older names,—mechanical or artificial dentistry,—and it does not savor so much of the "shop." Noting the very slight advance, or even change made in it of late, and the little attention it is receiving, except in those special branches that approach near to, and, in many instances, interlock with operative dentistry, we are led to doubt whether the disposition, so markedly shown, to draw the line sharply between the mechanic of the laboratory and the mechanic of the operating-room is really commendable. However much it may compromise our dignity as professional men, we must admit that our work is mainly mechanical. We recognize the importance of a thorough knowledge of diseases and of remedies, but to the dentist these would be of little avail without mechanical knowledge and mechanical and artistic skill.

In looking over the journals of the past year we have noted but little really new; and but little of interest, except in connection with pivot-teeth and bridge-work; and as in this department so many new ideas have been presented, and so many old ideas have been revived and modified,—some undoubtedly good, and some of questionable value,—we would suggest as a subject worthy of attention, "The preservation of roots, either as supports for artificial crowns, or to preserve the natural contour of the mouth." We might add to this, it is so nearly allied to it, "The repair of badly injured teeth by other methods than filling." These we think are matters of increasing interest. The various methods that have been

presented from time to time to avoid the inconvenience and annoyance attending the wearing of an artificial denture as usually made, require careful study and an extended trial before we can pass a fair judgment on their practical value.

In this connection we notice a method suggested by John G. Harper, of St. Louis, Mo. (*Archives of Dentistry*, January, 1884), for obtaining the model of a root on which to fit the band or collar or ferrule used in some methods of pivoting. He takes a piece of annealed steel wire, No. 27, passes it around the root at the point which the band is intended to fit, and, bringing the ends together, twists them until the wire is drawn tight and fits the root "snug;" this gives us a ring of steel wire, fitting the root accurately. Remove this carefully and lay it on the previously smoothed end of a block of close-grained wood, and with one blow of a flat-faced hammer drive the ring into the wood. This is said to give an exact model of the circumference of the root on which the band is to be fitted. After the band or collar is fitted, he further utilizes the arrangement to cut out the cap to fit into it, by laying a suitable piece of gold or other metal on the block, and laying the wire ring on this, with a sharp blow of the hammer cuts the plate the exact size and shape, ready to solder into the collar or band.

We see noticed in the journals a non-metallic compound suggested for dies to be used in a screw-press to form metallic plates. The use of a screw-press for this purpose is quite ancient, but the compound known as "Spence's metal," "Darcet metal," and by various other names seems to be new. From the descriptions given, its value as a substitute for metallic dies is doubtful, but it may perhaps be useful for models on which to adjust pivot-teeth and bridge-work. It is said to melt at so low a temperature that it can be poured into wax impressions. If it gives a cast as accurate as plaster and as hard as reported, it will be valuable. So far as we know it is not yet on the market in this country; nor yet has the formula for its preparation been made public.

Mr. Geo. Burton, in the *British Journal of Dental Science*, Feb. 15, 1884, gives a new method of working vulcanite. He packs his case—in a way not clearly explained, but—without a flask; then covers the rubber with tin foil and places the case in an iron box, and packs pulverized steatite around it until the box is full. This is placed in the vulcanizer and vulcanized. He claims for this method far greater cleanliness, a saving of time, and a better and stronger plate than by the usual method.

We recently noticed in a dental journal an article entitled "Is it honest?" The writer, referring to the re-introduction of a style of work known as "continuous-gum facing,"—a combination of continuous-gum and vulcanized rubber,—calls attention to its liability to accident and the difficulty attending its repair,—even a slight accident to the porcelain portion making it necessary to remake the case, and entailing nearly as great an expenditure of time and labor as did its original production, and asks, "Is it honest to make for or recommend such work to our patients?" He adds, "The dentist making such a case, for his own reputation's sake, might repair it at a slight expense, and pocket the loss; but what redress has the patient if he (the dentist) is at a distance, or perchance dead?" This seems a pointed and natural question, and one well worth considering, not only in connection with the style of work immediately in question, but also other expensive operations, notably some forms of bridge-work—tedious alike to the operator and patient, and entailing on the latter a large expenditure of money and endurance. The probability of accident, and the difficulty of repair in the absence of the original constructor of the work, we submit, are worthy of serious consideration.

We also call attention to a recent contribution to prosthetic dentistry by Dr. E. M. Flagg, of New York. A few years ago Dr. J. Foster Flagg, of Philadelphia, published in the *Dental Cosmos* a series of articles upon dental pathology, in which he treated at length the various temperaments and their relation to dental science and art. Dr. E. M. Flagg has culled from them and tabulated those portions—which we may perhaps term "expressional"—bearing upon the form and peculiarities of the individual, and their relation to the form, relative size, shape, character, color, and arrangement of the teeth, with especial reference to the selection of artificial substitutes.

While the tables prepared are only to be considered as they were designed to be, suggestive,—for there are many things to be borne in mind in selecting a set of teeth that *cannot* be expressed, and few that *can be*,—we consider them worthy of careful study. The doctor has shown great care and a thorough knowledge of the subject in collating and arranging them. Already his work has borne fruit, and and we have exhibited at this meeting* sets of teeth typical of the four primary classes of temperaments. These are skillfully and

* Exhibited by The S. S. White Dental Manufacturing Co.

artistically mounted and will bear a close examination. It is well to keep in mind in this connection that we do not put teeth into the same mouth from which we extract them. The mouth belongs to the same individual, but the changes that follow the loss of the natural teeth are so great and of such a character that the teeth that originally belonged to it could not by any possibility be put again in the same position and produce the same expression. In some respects we may follow nature too closely; we are compelled in practice to compromise some points. We may refer in illustration to the smaller arch of the edentulous jaw, necessitating a smaller tooth and less masticating surface,—especially upon the lower molars,—and the changes in articulation made necessary to favor stability.

The Section also reports two papers, by Drs. John Allen, of New York, and J. A. Robinson, of Jackson, Michigan, respectively.

Under the head of chemistry, the Section would report having received a communication from Dr. W. B. Ames, of Chicago (a member of the Section), in which he says: "During the last year I have been making some experiments upon the application of electro-chemistry in the mouth. One very satisfactory result has been the bleaching of pulpless discolored teeth by the electro-decomposition of a solution of sodium chloride within the cavity of the tooth by means of a galvanic current and fine platinum-pointed electrodes. Also, the disinfection of canals containing putrid pulps, by the decomposition of water acidulated with sulphuric acid,—one minim to the ounce,—within the putrid mass. This can be accomplished by passing the galvanic current from a finely-pointed platinum annode placed in the canal containing the acid solution, to a sponge-covered cathode, placed upon the mucous membrane adjacent. The electrolytic is generally much simpler than the chemical process of decomposing compound bodies, and especially is this the case when the decomposition is to be carried on within the oral cavity."

SECTION I.—Continued.

Artificial Dentistry.

Paper by J. ALLEN, of the Section.

WITH comparatively few exceptions, the department of artificial dentistry requires more special attention than has been bestowed upon it for some years past. Consequently, we deem it proper to suggest more thoroughness in this branch of our profession. Many important points should be kept in view by the dentist when he is required to construct artificial substitutes to replace the loss of the natural teeth.

When consulted upon this subject by our patrons, we should carefully study the requirements of each particular patient; for there are no two cases alike, and a set of teeth that would be well adapted to the mouth of one person in point of utility, form, and expression, would produce great imperfection, and even distortion, in the mouth of another; hence the great importance of the most careful discrimination between the various requirements of different persons in this branch of dental practice. The different functions of the natural teeth with reference to mastication, enunciation, articulation, and restoration of the natural form and expression of the mouth and face should all be fully considered.

From the taking of the impression, through all the different stages of the work to the final completion of a denture, various causes may occur which might prevent a successful result. Therefore, in order to avoid a failure from any of these causes, let us look for a moment at the acquirements necessary for one to possess who is to replace those organs which nature, with all her perfection, had previously formed; for, whatever be the mode employed, he will have to learn that it is the height of art to conceal art.

This, together with practical utility, should be the great point to attain in the construction of artificial dentures. To reach these points requires the skill and perception of an artist, the manipulation and experience of an expert, together with thorough mental

training and scientific research. Hence the impropriety (as we think) of calling this branch of our profession *mechanical* dentistry; for, according to our best lexicographers, a mechanic is one who constructs the products of some mechanical trade, requiring the rule and scribe to work by, in order to produce perfect uniformity in his results. But the skillful dentist carefully avoids this mechanical sameness, for he has no two cases which require the same form; consequently, this branch of his professional duties pertains more especially to that of the artist, whose powers of perception and discrimination enable him to see just what is necessary to meet the various exigencies involved in his operations. He has no fixed forms or rules by which to be governed, as the mechanic has; but he encounters some new phase in each succeeding case, as, for instance, in the length, size, form, position, and adaptation of the teeth, together with the lighter or darker shades and tones of the teeth and gums, all of which should be of a character suited to the age, complexion, and expression of the person for whom they are intended, thus producing one harmonious blending of all the features of the face of his patient.

To do all this, the operator must possess a knowledge of several branches of art and science.

Among these, he will find the elements of chemistry essential, with reference to the hygienic properties of the materials he employs and the means of preparing them for dental purposes.

He must also know the nature and properties of the various metals and minerals used in dental practice, together with the art of converting them into artificial dentures, especially if he does continuous-gum or block work. Our dental colleges and the community require of him a knowledge of anatomy, physiology, chemistry, and therapeutics, together with the principles and practice of dental surgery. He must also possess mechanical skill, which involves an insight into several trades, such as working the precious metals, modeling, molding, casting, etc., etc. In short, he must be a sort of compound man, embodying the knowledge of several branches of business, in order to perfect himself in artificial dentistry. With these acquirements, we claim for him a position in the front rank of his profession.

But it is evident that very many of those who construct artificial dentures do not possess all these qualifications: that they are not artists; that their artificial work has not that graceful and life-like appearance which characterizes the natural organs; that there is a

want of proper tone, expression, adaptation, and practical utility; and that their dentures exhibit only a stiff, mechanical appearance, that enables every beholder to spot them at once as artificial teeth. Such men must occupy the subordinate position of mere mechanical dentists, whose claims to supremacy are very small, and whose merits are still less.

In order to remedy this evil, let those who are below the proper standard ascend to the higher ranks, bringing with them science, art, and skill, gathering all along their pathway here a little and there a little, in order to fill up the great storehouse of knowledge from which success must flow.

In reference to the various modes now in use, they all seem to have their place, and may be adopted under the different circumstances attending particular cases. When consulted, the operator should examine carefully, and then decide as to what method will secure to the patient the greatest degree of practical utility and personal gratification, and then advise accordingly, bearing in mind that whatever be the mode skill, taste, and judgment must preside over the operation, for there is no system so perfect as to render these unnecessary, and the further the method is from yielding results true to nature, the harder will it be for the dentist to construct his work so as to elude detection in the mouth.

In this respect we have been able to approach much nearer the acme of our ambition by means of the continuous-gum system than with any other with which we are familiar; but, as this style of work speaks for itself, nothing that we could say by way of eulogium would add to its merits.

We would therefore suggest that as this branch of our profession seems to require a higher standard of qualifications than has heretofore been possessed by some dentists, who seem to study how to do the cheapest rather than the best work, we deem it proper to urge upon them the importance of bringing into requisition a much higher order of talent in the artificial branch of dentistry than our present records indicate; for this low ambition always has a downward tendency, and will place its votaries where they surely belong, —upon the lowest platform of their profession.

Now, while we can look with pride upon the advances that have been made within the last few years in the other branches of dental practice, let our efforts be also directed to the advancement of the artificial department, that it may equally merit popular commendation.

SECTION I.—Continued.

Who are Dentists?

Paper by J. A. ROBINSON, of the Section.

I HAVE chosen as a motto for this paper the words of Pope:

> "Be not the first by whom the new is tried,
> Nor yet the last to lay the old aside."

In a profession scarcely twenty-five years old in *national existence*, and one that has been formed among a people of the largest liberty under republican institutions, it is proper to inquire into the competency, character, and integrity of those who call themselves dentists, and see what qualifications are requisite for the discharge of the several duties they must necessarily perform, and of the general operations required of them in the daily practice of their calling. Because a dentist has made a set of teeth which have been worn with a tolerable degree of comfort, and which look respectably well in the mouth, it does not follow that he is a *good dentist;* neither is it certain that because he has filled a cavity in a tooth with gold or any other material which seems to do good service that he is competent to do good dentistry. By dentistry in this sense, I mean the repairing and restoring of teeth that are decayed and the supplying of artificial substitutes. This latter branch constitutes the artistic and scientific part of our profession. There is poetry or art in the shade, color, and appearance of a set of artificial teeth; and science in their organization, adaptation, and articulation. These combined constitute the philosophy of dentistry. A set of artificial teeth to appear natural should seem as though they grew as the trees grow, from the inside towards the outside, and, falling posteriorly on the ridge and on the cutting edge, like the perspective of a painting, give the work the appearance of nature. The natural teeth are neither oblong nor round: the molars are octagonal, with the posterior buccal section falling away and shortened towards the back part of the mouth;

the bicuspids are wedge-shaped, like the stones that form an arch in any mechanical structure; and the incisors a little more round, but still retaining the wedge-shape toward the palatine surface of the mouth. An artificial denture, to present a natural appearance, must approximate the rule laid down in this description.

Without scientific principles art is not art, and everything is a bungle. True art is poetic as Apollo and scientific as nature. The true artist lives in perennial glory in his labor or his imagination, for labor is the visible form of the imagination. Anything short of the scientific never fills the whole mind, but only the more superficial part of it. It is also true that the real artist is never satisfied with simply *what will do;* for it is not the culmination of his highest thought. He is not satisfied with what he does occasionally from a good impulse, unless he has at the base of that impulse a sure and scientific end. Without this scientific principle all the labor bestowed upon a set of teeth is only elaborate nonsense, for they never satisfy the uses they were intended to serve. We do, indeed, sometimes find in nature a physiognomy of the teeth that does not seem to correspond with the physiognomy of the face, but that is only when nature has been obstructed in her endeavor to be true to herself, and it is seldom that good and perfect teeth, however homely, can be substituted by an artificial set, without the loss, in some degree, of the original character of the face,—so true is nature to her divinity.

Diversity and inequality oftentimes tend to beautify and adorn; it is certainly so in nature; hence the dentist must have a certain aptitude out of which this science and art may be evolved. A man may possess two qualities that may be equal and yet different; as, he may be an artist and a mechanic at the same time; but it is the combination of these two qualities that makes a good dentist, as the combination of the poetic and the scientific is essential to constitute an artist.

One of the essential things for a dentist to know is how to make his own instruments, even with the vast variety now in the market. Our instruments are so delicate that they are easily broken, and we cannot do good work with dull tools. I see that instrument-making is made a specialty in one of the dental colleges. We must know how to make instruments in order to be able to repair them; and we must know how to keep them in order. We cannot dwell too earnestly on the importance of stone-burred serrated points for the absolute welding of cohesive foils. One who has not tried the experi-

ment would be surprised at the difference between dull and sharp serrated instruments. The latter give strength to the filling to stand hard work in mastication and to resist breaking, in the incisor teeth, which is impossible with the former. In a perfect filling all the parts must cohere; they must be self-supporting and supported, and it is impossible to effect this without perfect instruments. The instrument is the vehicle of labor, and bears the same relation to labor that the car does to the railroad. There are no two operations that are alike or that require the same manipulation, and of course they require different instruments.

Now, it may seem strange to those who have not given the subject thought that the essentials of dentistry are the poetic and the scientific combined. It is only because these words have not been commonly used; though dentistry has often been called an art, and is to-day fast passing into a science. The true artist is always filled with a silent admiration for his work. Even the dumb, inarticulate material seems to have a pulse that beats in harmony with his own, and he is filled with a conscious power of his own possibilities until his thought passes into deeds. The undulations flit before his vision, and the material will march like files of soldiers to fill the imperfect forms until they seem to become spirit and leap out into life. There is nothing mechanical in the appearance of the work, though it is mechanical in execution. In good dentistry these principles are hidden in the naturalness of the work, as in nature herself.

The great thing to be avoided and shunned by those who are in position and power,—those who are leaders in the profession,—is, in all meetings like this, the appearance in discussion of dictation on the one hand, and dilettanteism on the other; for only the earnest soul will be beloved, and only the gentle and modest soul will be revered by those who are striving to follow and learn.

True art must appear natural and living, and be according to the laws of the living. All living things are according to mechanical and geometrical laws, and nature is perfect art. Upon this platform we must build, for it was upon this platform that the world was built.

It does not seem possible for a bad man to be a good dentist, for a bad man's heart cannot conceive the real truth; and what the heart cannot conceive, the hand can never delineate. Bad passions are always pushed aside while we hold communion with art, for we are filled with a divinity. The artist-dentist is learned, though he may never have been schooled; he has graduated, though he may never hold a diploma.

Now, it seems to me that there are many good operators among our older members, who began practice before the facilities for obtaining an education were what they are to-day, whose circumstances have precluded the possibility of a graduating course, but who have so lifted up dentistry by their genius and inventions that some acknowledgment of their labors ought to be made by the profession. They have done good work *outside* of the schools; they have graduated themselves; and, as in the other professions, the title of L.L.D. is conferred upon those whose labors have helped the world, so might the distinction of a title be properly conferred on these. There are some meritorious persons whom I have met within the past few years,—some grand men,—who are so sensitive that they prefer to remain outside rather than sit with those among whom they fear they are not welcome. A small ceremony like the one I have suggested, or a broad invitation that would declare to such persons that we are not exclusive, would open a door that would bind us in a brotherhood,—that would make us stronger, more generous, and grander. Justice, when it asserts itself, embodies itself in deeds. The great charm of men, or of professions, lies in their moral rectitude.

We have thus far only considered the dentist as a mechanic and artist. Let us now try and look at him in a more practical point of view, and, as some think, a higher,—in the capacity of physician and surgeon of a specialty. It is not a fiction of fancy to say that a man is not a dentist unless he is master of his whole calling, and that relates to the cure of the diseases of the mouth, and remotely to the whole system. The surgical operations in the mouth, and especially those on the teeth, are in the main simple, when well understood, though sometimes difficult to perform: but they are all-important in their relation to the well-being of the whole physical man. You will observe how closely the physician is allied to the artist and the scientist in the diagnosis of his cases; and the surgeon to the mechanic and the philosopher. This higher calling is growing upon the profession day by day, as the profession is growing in the community.

Perhaps it may not be out of place, and I may be allowed to digress far enough at this time, to suggest a few things that seem to me to be fundamental to our very existence and standing, and as essential to securing acknowledgment in this nineteenth century civilization.

If the education and culture of the children are essential to the

well-being of the government, the physical system is essential to the man; and to conserve it is the work of the physician, the surgeon, and the dentist. Hence, as we have to live, the care of the teeth seems to be of fundamental importance. It will no longer be necessary to extract the teeth when parents can be impressed with the fact that they are essential to the health and well-being of the child; and since we have the aluminium disk and the corundum powder, it seldom becomes necessary to fill children's teeth on the approximal surfaces, if taken in season, as the decay is readily polished off on the "Arthur plan." This method is particularly applicable to the posterior molars of the first dentition, and to the anterior surfaces of the first molar of the permanent set, and I have no doubt that it is better practice in incipient decay than to incise by drilling, as is often practiced in shallow cavities. For many years I have practiced the Arthur plan in inferior bicuspids, and often in superior, with great satisfaction. The painlessness of the operation will never disturb the child, and that is very important in the treatment of the young.

The most desirable attainment to be reached is the *painless operation*. Something needs to be discovered that will bear the same relation to removing decayed dentine and highly inflamed bone-tissue that anæsthetic agents do to tooth-extraction. This being found, there will be more frequent examinations and operations with advice from the dentist, because there will be less dread of pain. The most effective agent I know for this purpose is composed of equal parts, by weight, of caustic potash and carbolic acid, braided together into a crystalline paste, and applied to the cavity before the cutting is commenced, and then again after the loose decay has been removed. If you desire it less pungent the quantity of caustic potash may be reduced, or you may wipe it out with carbolic acid. The pain, which is very slight at first, soon passes away, and then the cutting is painless. My theory of the action of this medicine is, that the application coagulates the fluid in the tubuli, and renders it incapable of transmitting sensation to the nerve in the pulp, but does not destroy it. Both these agents are antiseptic, and both escharotic, but the acid and the alkali combined form a salifiable base that is perfectly harmless to bone-tissue, and gives almost immediate relief to that most disagreeable of all feelings caused by preparing cavities for filling. If the pulp is exposed, the slough is removed almost instantly, and an eschar is formed so delicate that it heals by first intention, and when that is covered with any of the

oxyphosphates now in use the vitality of the pulp is preserved and the tooth is saved. The only thing necessary is *care*, and the work is easily accomplished by filling the tooth in *sections;* that is, filling one-half the cavity without removing or displacing the cap, so that the dust of the cap will not irritate and inflame the pulp.

The bacteria theory must now be considered an accepted fact, as the best practitioners are full of experimentations with their antiseptics, and that mode of practice presupposes the septic or putrefactive condition of disease; and it is an acknowledgment of the presence of bacteria. Chloric acid has thus far resisted every effort to decompose it. It is contained in the buccal fluids of the mouth, and manufactured from the salt contained in the food, and is antiseptic. The lactic acid and oxalic acid that ooze from the marginal gums of neglected teeth and the septic condition of the uncared-for mouth, with the oxygen taken in with the breath, and the saccharine nature of the food, furnish the necessary conditions for the propagation of bacteria that destroy the teeth and gums. Now, when the chlorine contained in the buccal fluids or manufactured from the salt in combination with the acids in the mouth comes in contact with *tin*, it is set free and unites with it and forms chloride of tin, which is antiseptic, and protects the organic matter from decay; and hence tin becomes the best preservative material for fillings known to the profession. Food thoroughly masticated becomes filled with the fluids of the mouth containing chloric acid, and is less liable to become septic; hence the teeth of persons who chew their food well are less liable to decay, because of the condition of the food, as well as because of the friction caused by mastication *and deglutition*. Perhaps the nutritive fluid passing through the tubuli containing chlorides, acts internally upon the tin fillings as well as the fluids of the mouth upon the surface, so that the whole filling becomes antiseptic. This constant effort to reproduce tissue and to resist dissolution lies at the base of all evolution, and when we can rightly diagnose disease and assist in any way to promote health, we add another link to the chain that lengthens human life.

When we get outside of the domain of fact, we base our hypotheses on appearances. The infinitesimal *cause* of disease, and its infinitesimal *cure*, are in many cases beyond mentality. We may be certain, however, that amalgam fillings are failures whenever the cavity runs beyond the free margin of the gums. Amalgam fillings are neither antiseptic nor escharotic, and the shrinkage will form a subterranean crypt between the walls and the filling, pro-

ducing a compound cavity that deceives both patient and operator, and becomes the natural nursery for the promotion and growth of bacteria. Amalgam cannot be drawn over towards the borders of the cavity; and the moment crystallization begins, that moment the borders become a refuge and home for the bacteria.

There is a something beyond microscopic examinations or chemical experimentations: as much beyond as being is beyond existence, or spirit beyond matter.

I think the experience of the profession will bear testimony to the excellent qualities of tin as a filling; but the labor required to insert fillings of tin in many places brings into use amalgams, gutta-percha, and oxyphosphates, and thus, subsequently, the loss of many valuable teeth occurs.

Tin has less elasticity than any other of the metals; when bent, the crystals break or separate, and produce what is called the "cry of tin;" but, combined with platinum and gold, the compound is more ductile than pure tin, and harder when burnished or malleted, being capable of resisting attrition, even when attenuated near the borders of the cavity.

After three years' experience with such materials, I do not know of a single failure or leakage in a filling in my own practice, and I deny the necessity of extracting any tooth, that (as Dr. Morrison, of St. Louis, says) cannot be *taken out with the fingers.*

The bane of all the professions is the love of ease and the unwillingness to work. Show me a single person who has made large attainments without labor, and—in our own profession—hard labor, both mental and physical. Point to a single artist of eminence who has not toiled early and late, or to a scientist, a physician, or a surgeon,—for they are substantially the same, when devoted to their calling.

The true artist is so filled with the love of his calling that he has no time to be selfish and to think of things as belonging to himself; but in serving his calling he loses himself in his profession, and his ledger accounts are neglected; and that is the reason why so many of our best operators and thinkers are so poor.

Now, it must be apparent to every one that there are a great number of persons at this time who have the sign "Dentist" over their door who are totally unfit to practice our profession, and the "examining boards," established by law that has kept pace with our civilization, are the only power that can winnow these out and decide who are dentists. In this strife of the survival of the fit-

test the hottest battle must be waged. It is so in all nature: those who are best adapted will be preserved, and the others must perish. This law runs through the lower forms of animal life, and is true of ideas and character. It will require the soundest wisdom, coupled with justice, to discriminate, classify, and decide who are valuable and who are worthless. We must expose all shams, with a heart full of love and human sympathy for the good and a hatred for all that is bad. Those who prune with care strengthen the parent stock. It is a law older than man that has decreed that the best must live, and also that when the whole carcass is rotten it must be destroyed. I am aware of the difficulty, and that we shall often be misjudged and blamed; but he who pulls the weeds strengthens the corn, and does it because he loves the corn the best. So we must discuss the merits of men as we would a problem in geometry. If we are wise we shall all put ourselves in training for the work that is before us.

In closing, let me say to those who occupy high positions in the profession, let us hold out the hand of brotherhood to all meritorious operators, whether educated in or out of the schools—if they are *educated*—until we are a united whole, never to be broken, whose light shall illumine the world.

SECTION II.

Dental Education.

Report by C. N. PEIRCE, Chairman.

THOUGH the annual reports of Section II. are not to be received as exact chronicles of the actual progress attained in the educational field, they may be accepted as fairly reflecting the general tendency of thought among the friends of higher education. That the actual progress made falls below the ideal advancement is to be expected. It is rare that the practical application of a theory is contemporaneous with its promulgation. But that there have been real, solid advances in the methods of imparting knowledge and in the standard of qualifications is not to be doubted.

The exhaustive discussions which have been had upon this subject, stimulated by previous reports from this Section, show the importance of the position which the educational problem occupies in the minds of the members of the profession. The fear so often expressed lest the seeming apathy and failure to appreciate the responsibility of their position evinced by some teachers should issue in disaster, testifies to the general anxiety that no backward steps be taken. This anxiety, which has been intensified by the immature standard of graduation revealed in the annual announcements of some of the schools, has seemed to warrant the disappointment and discouragement felt and expressed by many sincere members of this Association. But, notwithstanding these untoward indications, the cause of dental education has progressed. At no previous time were the opportunities afforded to students for the acquirement, before graduation, of proper qualifications for practice equal to the present. Never before was there so general a desire among the schools that their curriculum and standard of graduation should represent the highest degree attainable; never before was there a time when the representatives from the schools could have formed an associa-

tion and adopted resolutions with almost perfect unanimity, abrogating customs which have been in vogue for over thirty years.

Thirty years ago the regular sessions of the best schools comprised at most only four months' instruction, and, by allowing one month's grace, this was frequently shortened to three months; and even with this limited time, two fundamental branches, anatomy and physiology, were embraced in one chair. The regular course of lectures in the same schools now extends over five months, and opportunity is afforded to the student, by means of auxiliary spring and fall courses, for five months' additional instruction in the year. The chairs of anatomy and physiology are occupied by different professors, each giving a full illustrated course on the subject under his care.

There have also been equally marked advances in the standard of requirements for graduation. To compare the acquirements and qualifications of the average graduate of to-day with those of the men who received their degree of D.D.S. from the same schools twenty years ago, would certainly be a source of encouragement to those who have so long labored for the enhancement of educational opportunities.

The Section also notes, as an evidence of interest and progress in dental education, the increased efforts which are being made in the several States to procure legislation for the regulation of dentistry. These efforts have resulted, so far, in the enactment of laws in many States for the protection of the citizens against charlatanism. For the better enforcement of these laws, examining boards have been established, which, for the purpose of increasing their efficiency, have in turn organized a National Board of Examiners. The proceedings of this body, which were epitomized in the last annual report of this Section, are an earnest of its labors.

As a further evidence of the interest felt in education may be mentioned the late meeting of the faculties of the several schools, called for the purpose of establishing, if possible, an advanced curriculum and a uniform standard of graduation, and of effecting the organization of an association of the colleges. The result of the labors of this organization, which has just held several sessions, are epitomized in the resolutions adopted, as follows:

Resolved, That after the session of 1884-5, the colleges belonging to this association shall require attendance upon two full courses of lectures previous to the student's coming forward for graduation; *provided*, that these two courses shall have been attended in separate years.

Resolved, That after the session of 1884-5, the possession of a medical diploma from a reputable medical school be accepted as equivalent to one course in dentistry, the holder being required to pass one year in a dental infirmary, the year's study to include a course of lectures in a dental college, before coming up for graduation.

Resolved, That one course in a medical college be accepted as equivalent to one year's pupilage in a dental office, but one-year medical students shall be required to attend two regular courses of lectures in a dental school.

Resolved, That we recommend that a preliminary examination be required for entrance to our dental colleges. Such requirements shall include a good English education. Candidates holding the diploma of a recognized college, academy, normal or high school, or other evidence of literary qualification, may be received without examination. In case of any student's failing to pass a satisfactory preliminary examination, the other colleges of this association may be informed of the fact.

Resolved, That we agree to adopt a graded course of instruction and an intermediate examination, which course of instruction and examination shall be conconducted as the faculties of the different colleges in this associatiou may deem proper.

We recommend that the following subjects and arrangement be adopted by the colleges of this association, viz.:

First Year.—Anatomy, with dissections; Physiology, Histology, Chemistry, —didactical and practical; Mechanical Dentistry.

Second Year.—Review of junior year studies, Pathology, Surgery, Materia Medica, Therapeutics, and Operative Dentistry.

Although the facts we have mentioned indicate the progress that has been made, we are not to cease from our efforts to achieve still further advances. What has been done but widens our field and increases our responsibilities, and step by step with the improvements in the opportunities for acquiring an education comes, with even longer strides, the evolution of the profession as a whole and of the needs of its clientage. This day is demanding from those entering upon the study of dentistry a broader intellectual development; a sounder, more substantial knowledge; a keener, more critical judgment for the study of cause and effect as revealed in the histology, physiology, and pathology of our specialty; a more conscientious personal responsibility; a more wholesome moral standard; and last, but not least, a clearer appreciation of the worth and wealth of our calling. The means by which these qualities may be made to enrich the future of dentistry and maintain its continued growth in dignity and worth, is an interesting and important question, not alone for the consideration of the college faculties, but worthy of the careful thought of this Association.

Of the three hundred and sixty-five (365) students graduated within the last five months from the twelve principal dental schools in this country, 5 per cent., or eighteen (18), will, by the end of the first year after graduation, have dropped out of the profession; and by the end of the second year nearly as many more will have sought other occupations. Of the three hundred and twenty-eight (328) left, not more than 5 per cent., or sixteen (16), will be recognized at the end of five years as actively interested in the scientific aspect of their profession. These figures, of course, do not represent accurate statistics of the classes just graduated; but they understate, rather than overstate, the facts regarding average classes of previous years.

The results observed, in the estimation of Section II., are due somewhat to the following causes: Every year numbers are added to the profession, whose deficiency in the elements of an English education operates sadly against their becoming proficient, and this condition must always remain an obstacle to the progress of such and a modifying influence on the progress of their associates. Then there are those who have exquisite manipulative ability, but to whom text-books and lexicons are but a confused mass. With this class manipulative skill and precision are acquired as the result of observation, industry, and patience; but these, though desirable accomplishments,—indeed, essential to the skilled artisan,—alone never make the educated dentist. On the other hand are those to whom theory and principles are a delight. The *why* and the *how*, to their *minds*, are as trite as the alphabet; but their *fingers* continuously and utterly refuse to respond to culture. To these, success is as impossible as to the former class, because they are unable to acquire the requisite amount of skill in the operative and mechanical departments.

What is needed to remove, or modify, these causes of failure is the adoption of some method by which the fitness of those entering the profession may be known. An appreciation of the demands of the profession, and a realizing sense of the necessity for the adaptation of the individual, in capacity and inclination, to these requisites, as well as a high sense of personal responsibility and an exalted moral standard, would tend greatly to lessen the proportion of those who waste years in fruitless study, and to increase the number of those who come to the front as educated dentists, and would thereby enhance the literary, scientific, and social status of the profession.

This Association has frequently discussed the propriety of the

dental schools establishing preliminary examinations and requiring attendance upon two full courses of lectures, without regard to previous practice, before admitting students to examination for the degree of D.D.S. If the suggestions and restrictions embodied in the resolutions previously adopted can all be carried out in the spirit and intent with which they have now been accepted, they will cercertainly prove important factors in the cause of progressive education; but while faculties are dependent upon the fees received from students for the necessary college expenses and their meagre compensation, it will require encouragement and care to make them more than a dead letter.

In reaffirming its faith in the wisdom of the resolutions heretofore adopted by this Association, Section II. is not unmindful of the fact that recommendations of the American Dental Association are in no sense mandatory upon the governing powers of the various schools; but, formulating as they do the deliberate judgment of the highest representative body of dentists, their practical application is only a question of time. But does our responsibility end with the formulation of principles for the guidance of the colleges? May we not hope, by judicious effort in other directions, to stimulate a thirst for higher attainments—a broader and more thorough culture? Can this body do nothing more than is being done to enhance the status of its own members? Is individual research recognized and appreciated to the extent of its worth and influence? Are we offering all of the incentive to original research and careful observation that is possible?

Section II. offers these inquiries, trusting that some way may open for further encouragement and a realization of something nearer an ideal association.

DISCUSSION.

Dr. Spalding. Are graduates of medical schools admitted to graduation on one course of lectures?

Dr. Peirce: The resolution passed by the association of colleges is that gentlemen having graduated from reputable medical schools shall, upon spending one year in the infirmary, including a full course of five months' lectures in the dental school, be entitled to go forward for examination and graduation, and that those who have taken only one course in medical schools be required to take two

full courses in a dental school before they are eligible for graduation.

Dr. SPALDING: I will only occupy the time as to one particular point. I am very glad to know that the progress indicated by this report is being made, and that a higher standard of dental education is likely to be attained, after this year, at any rate. It has my most cordial indorsement, and the only objection I have to the resolutions which they have passed, is that they admit a man holding a medical degree to become an authorized practitioner of dentistry by attending one course in a dental college, including one infirmary course.

Dr. PEIRCE: He must have spent a whole year in the infirmary.

Dr. SPALDING: I don't care if it is a whole year. I say a man who has simply graduated in a medical school is not as well fitted or as competent to become a skillful dentist in one course as a man is who is a good chemist and a skilled mechanic. A man who is a good chemist and a skilled mechanic will make a better dentist at the end of one course than any man who has simply gone through with a medical course. I want to make that point, and to make it strong, because I believe it is an important one. We have had a great deal too much of that kind of thing. All I want and all I ask is that a dentist shall be well qualified to practice his profession before he enters upon it. I don't want to let men in who are not qualified, while those who may be better qualified are shut out on technicalities.

Dr. R. FINLEY HUNT: I wish to express my gratification—which I certainly think will be shared by all whose hearts are set on the elevation of our profession through the elevation of the standard of dental education—that a stride has been made by the colleges of the country toward harmonious action in this common cause. This meeting of the dental faculties was looked forward to with a great deal of anxiety for fear that differences of opinion on the part of the representatives of the different colleges would result in obstruction of this work which is being done. I consider that a great deal has been accomplished in the results of the action of the association of faculties, as set forth in their resolutions. Like the gentleman who preceded me, I feel that some things have been done not as well as they might have been, but there has been so much done that we all ought to be grateful, and we should have confidence that these gentlemen who have done thus far so well will be able to see the imperfections and defects of their action, if there be any, and correct

them hereafter. I am very glad there are authorized bodies now who can regulate the matter of dental education. It seems to me that they are constituted just as they should be; that is, in the association of faculties of representatives of the various colleges on the one hand, and in the association of national dental examiners of those who represent the State societies on the other. I understand that this step has been taken to secure harmony of action between the associated faculties and the association of dental examiners. Let us all hope and pray that their action may continue in the state of harmony which has characterized their proceedings thus far. Then we may be justified in expecting that the best results from their labor will ensue. This Association should give them every encouragement to persist in their work of bringing the profession of the country, in point of education and acquirements, up to what this Association has desired for so many years.

Dr. FRIEDRICHS: I entirely disagree with the views expressed by a previous speaker in regard to according no privileges to a graduate of medicine. I think that when a man graduates as a doctor of medicine he has already derived authority to practice dentistry, if he so desires. I think that the action of the faculties was very wise in adopting that clause offering that inducement to graduates in medicine who desire to become dentists; because we know very well that where men practice dentistry without this qualification they often make poor dentists. Therefore, I think it is the duty of the Association to support the faculties in these resolutions as a whole.

Dr. ALLPORT: I wish to thank this Section for the report which has been made, and especially do I wish to thank the dental college association for that particular point in the resolution that they have adopted. It comes more nearly up to my idea of what our colleges should be and what they should require than anything ever done before. It has long been a favorite idea of mine that all practitioners of dental surgery should be specialists in medicine, and should be so regarded,—that is to say, I believe that, when a man treats any organ of the body, his knowledge should be laid in the science of medicine. Dentistry is not a profession, nor can it be, except as it is medical, and in proportion as it is medical is it a specialty in medicine. Why, therefore, should we ignore or speak slightingly of a medical education; for, take away the medical part of dentistry, and it becomes a mechanical pursuit and nothing more. Surgery could not be made a profession without the accompani-

ment of a medical education. Otherwise it is mechanical; there is no science about it. I wish, therefore, to thank this Section, as well as the dental college association, that they have recognized medicine as having something to do with the practice of dentistry. I am not one of those who believe that a simple education in chemistry and mechanics will make a better dentist, after two years' training in a dental school, than a thorough medical education will do with one year in a dental college. Those thus educated may start out as better manipulators. I will admit that; but they cannot have, and few will ever acquire, that foundation for a scientific practice of dental surgery that they would possess if they had first obtained their medical education.

This is a step in the right direction, and so sure as the sun shines the time will come when all dentists will be required to be medically educated.

Dr. SPALDING: In this matter of preliminary medical education, it seems to me that the cart is put before the horse. Let us perfect ourselves in dentistry, and then, if we choose to adorn ourselves with a medical education, all very well. The difficulty is that we attempt to lay the foundation in the science which does not include our own at all, or, if at all, only to a small extent. What is the difference between dentistry and medicine? Dentistry includes anatomy, physiology, chemistry, and special pathology and therapeutics. It does not include an accurate knowledge of obstetrics and gynæcology, nor an accurate knowledge of fevers and the like. The foundation principles upon which dentistry rests are anatomy, physiology, and chemistry, including also special pathology, therapeutics, and materia medica, with what we call operative and artificial dentistry. These compose the basis upon which the science of dentistry rests. If medicine can add anything to it, we are very glad to have it; but why should we educate ourselves, or require others to educate themselves, in branches that do not essentially belong to our profession? Why should we educate ourselves in non-essentials first, and in essentials afterward? Let us have the essentials first, and then, if other things can be added to advantage, that is a good thing.

Dr. COOK: I would like to ask the gentleman if he will give us what he conceives to be the foundation of a medical education. What is, commonly speaking, actually understood by the general medical practitioner to constitute that foundation?

Dr. SPALDING: Dentistry and medicine have some things in common, it is true.

Dr. Cook: And if so, I would like to ask where the difference between dental education and medical education begins; where the special training begins?

Dr. Spalding: The idea is that those branches that are common to both and that are taught in both dental and medical schools are, or should be, taught equally well in either. But they are taught and studied with reference to the future occupation of the pupil. Take chemistry as an example. The drift of instruction and study in dental chemistry is quite a different thing from that which is pursued when medicine is to be practiced, and so of the rest. Our students cannot master any of the sciences, and hence the knowledge they acquire of each should be that which will best serve them in the profession they have chosen. Dental schools teach the medical and other sciences with reference to dental practice; while medical schools shape their courses with reference to the practice of medicine. If all can be learned, very well; but if not all, then the things that are most essential.

Dr. Allport: Great stress has been laid upon preliminary education. Of course, a preliminary education is essential to the study of medicine or dentistry, but what is more preliminary to the study of dentistry than a medical education. One thing more. I want to ask these gentlemen who cast slurs upon a medical education as being of no consequence, what would they have done without the medical profession in the first place? They say it is only an ornament, but as a profession we have few text-books.

Dr. Atkinson: Thank God.

Dr. Allport: What we have are from the medical profession. If they are not the best, where are they? Who has ever written one but a medical man?

Dr. Atkinson: A dentist exclusively.

Dr. Allport: Professional or scientific, they do not exist to-day; and the foundation of our practice is from medical text-books.

Dr. Atkinson: How about Taft and Richardson?

Dr. Allport: I know to what the gentleman refers. Taft and Richardson are medically educated. But I repeat, if we are going to ignore and cast aside medical books, we have nothing to take their places.

Dr. Atkinson: We don't want anything to take their places.

Dr. Allport: Then we had better not study at all.

Dr. Atkinson: That is not it, either.

Dr. Allport: That is a kind of argument that will not answer.

They are the best books we have. They are written by medical men. They may have been written by dentists, but they were medical men, nevertheless. Yet people speak slightingly of medical books and medical education. There is no man to-day who is a scientific dentist who does not depend upon a medical education, whether he calls it by that name or not. Why is Dr. Atkinson what he is? We all know what *he* is very well, and we respect him most highly for his scientific attainments; we sit with profound attention when he speaks; we are aware that he is skilled in the treatment of oral and surgical diseases, and we are also cognizant that the basis of his special knowledge is founded in the science of medicine, procured from medical text-books; and without this medical education he would not have become the Dr. Atkinson he is to-day.

Dr. ABBOTT: I have no doubt, from the remarks I have heard, that the gentlemen all think about the same. It strikes me very forcibly, however, that what are termed medical works are not, as a general thing, used in dental schools. What are used in dental colleges are scientific books, that no medical or dental college can possibly get along without and teach what it should. The foundation of all our education, so far as our profession is concerned, is anatomy. Without our knowledge of anatomy we would make very ordinary dental surgeons.

Dr. SPALDING: There was no anatomy until there was operative anatomy.

Dr. ABBOTT: That is true. I should call it surgical anatomy. That is the kind of anatomy we have to rely upon. Then comes physiology. The dentist cannot get along intelligently without understanding that. That is not medical. Works on physiology are not medical works; they are simply scientific works. Then we want some pathology, some chemistry. Those are the foundation-stones of our specialty, and they are scientific. Now, when we come to the general practice of medicine, we have works upon the treatment of all diseases to which flesh is heir. These are strictly medical works. Then, in our own science of operative dentistry, we have all the works pertaining to that, for our special benefit. There is one thing certain, however: no man, whoever he may be or where he may come from, can get too much education. So the more we ask of a young man, the better will that young man be qualified to carry out his life-work. That is the reason why we commend this association of dental faculties for the steps which it has taken. I certainly feel that the steps have been great ones

in advance, and that thereby we are put in a position to respect ourselves and to make others respect us.

Dr. RHEIN: There is no question that the books treating of anatomy, physiology, chemistry, and materia medica are scientific works, but if they are not also medical, I would like to know what are medical works. They really comprise all there is of medicine, and medical education begins and ends with these.

Dr. ATKINSON: I have personally been called out, and my personal history has been referred to in this discussion. I want to eliminate all that, and to call to your minds the morality that lies in this question, which has been ignored by every speaker. They have not touched the real gist of the matter at all. Every example that has been given here of medically educated men being better dentists for the reason of their medical education, is a subterfuge and a falsity. A dentist is not a regular medical man by reason of his M.D., but by reason of the knowledge that he got aside from his efforts to get the M.D.

Dr. ROBINSON: Afterwards.

Dr. ATKINSON: It has been said that I am only a medical man because I was educated as a medical man. A man is not a medical man until he has learned from actual experience in the hospital and in actual practice. The mere title don't mean anything.

Speaking of text-books, it is one of the best things that ever happened to us that we may have no mandatory text-books as a profession. That is where we stand higher than the medical profession.

Speaking of education, you have probably heard me say, *ad nauseam*, that, if I had my way, I should first give a student a classical education; then I should put him through the best medical course to be had; and then I should matriculate him in the dental college; and before he finished there I should see that he was a good operator. We do not want in our profession men who are merely "tooth-carpenters." The moral deficiency in the minds of such men is the thing we want to emphasize and push out. We want the moral responsibility to rest upon them, so that they shall know for themselves that they are right.

That is not all. Some one has said that if we would win respect we must be self-respecting. Yet some of the greatest fools I ever saw have respected themselves the most. The men who are the least educated assume the most. Those who are disposed to be the most exclusive are sometimes the greatest ignoramuses. Those men

who are determined to keep the boys away from the means of acquiring real knowledge are the very men who have false degrees. They think this fuss and feathers that has been spoken of is an ornament. God save the mark! I want no such ornaments. I would rather stand disenthralled and naked before heaven and earth, with nothing but my skin on, right side out, than have such an ornament as that.

It is the patient, careful observer who is illuminated by the truth in nature that he records and tells to some brother, and they, by association, bring all their different contributions together. If we would do that and give our true perceptions of the righteousness of the matter, knowing what we were talking about, and not going off half-cocked at the first blush of the aspect of truth that always comes hind end foremost to us, we would be men; we would be as a light set upon a hill, that no man can hide or ignore!

What is the source of our education to-day? Where do we get the Shekinah that has so beautifully illuminated our heads and hearts here? Did we get it from the text-books? What is medicine? It is nothing until you have sin. Medicine is nothing but the correction of a perverted activity. God knows how earnestly I have desired to apprehend the conditions of cases, that I might be of use and be made the savior of those who were suffering from maladministration of an assumed knowledge that the individuals who had given the poisons which had worked the mischief did not possess. Let us begin anew in this matter of education. Why when we have the means of illumination should we not begin *de novo?* What is education? It is not stuffing a man with the grace of God, and driving it into him, whether he will take it or not. It is the calling out, by the grace of the Creator, of the possibilities in each individual. Education—*e duco*—"I lead out!" Who is the "I?" It is the leading of the great I AM, who is the FATHER of us all, in whose munificent radiancy we live and move and have our being, mentally and physically. As I said, medication is the correction of a perverted current. They call this a pathological condition. I wish to God we could get rid of these hindrances in the way which have been artificially set up. Pathology is only deranged physiology. It must have been the inspiration of a swamp angel that suggested some of the things that we have in our system of dealing with ideas and processes. I want you to understand, when you are studying anatomy, that you are only studying second-hand physiology. Physiology is before anatomy, as type is before body and as faith is before

all practice. Faith is the "substance of things hoped for; the evidence of things not seen." That is exactly what we want to get now. We want to break down the middle wall of partition, get our Shekinah, and do what we do according to our sense of righteousness, so that what we do shall be without rebuke to our own consciences. If we do that, we need not fear the sayings of Mrs. Grundy. We want to hold the truth in righteousness. What was the damnation of the old school? It was that they tried to hold the truth in unrighteousness. Let us not waste time quarreling over text-books. Louis Agassiz was a man sent from God to this world—to these United States of America. When he was asked, "What text-books shall I have?" he told his questioner to take a scalpel and a fishing-net, go and catch something, and study the text-books of Madame Nature. Now, let us do that. Let us just ignore all this dead-weight that we have so long carried in sueing for recognition by the medical profession.

If I have stated aught which is error, if I have stated anything that is foolish, unloving, unkind, anything that the highest morality of any of you can reject, then ask me any questions you please.

Dr. Friedrichs: I want to ask Dr. Atkinson only one question. He is evidently terribly opposed to text-books. Yet text-books are only the truths which men discover, written down. The truth is eternal; and when it is discovered, some one is going to put it in a text-book. Dr. Atkinson is himself writing a text-book. How can he oppose them so when he is writing one?

Dr. Atkinson: Simply for this reason. When I studied embryology, I found that there was a thing called a placenta, that for the time being was of vast importance to the fœtus. But when the time came, through the evolution of the organism by the action of the functioning power, that the fœtus was to receive its radiancy or energy by which it lives and moves through another apparatus,—namely, through the lungs,—then the child, at birth, sheds the placenta. Now, when he does that, for God's sake don't keep it on him. My objection to text-books is that they bear that relation to us in our onward progress in science. They are embryonal, and we have outgrown them. That is my reason.

SECTION III.

Dental Literature and Nomenclature.

Report on Dental Literature.

By J. TAFT, Chairman.

EVERY material art and every important branch of human occupation has its literature; and in the stage to which the world has now arrived none who desire to keep pace with the progress of the age can afford to ignore it. Letters have come to be an important agency in the development and growth of the arts, sciences, and industries everywhere. They serve to convey thought from one person to another, from one place to another, from one time to another, from one generation to another, from one age to another. Even the more simple mechanical industries have each their separate literature; thus manifesting the power of letters and the importance and value of their right use. The question before us now is, to what purpose has the profession which we here represent to-day used this instrumentality, more particularly during the past two years. Almost every year during the last decade there has been somewhat of a report upon this subject. Section III. will, however, only endeavor now to glean from the growth of the last two years. In attempting a report of this kind, it is not possible to make one that will meet the approval of all. It is not possible to write a book, or issue a periodical, or even prepare a monograph that will not receive criticism and objections. This is to be expected when there is such diversity of apprehension and capacity in the readers of our books, journals, etc. For the last two years there is much ground for encouragement. Observation leads to the conclusion that much of solid scientific work has been done, and permanent record made of it. Perhaps in no similar period during the last fifty years has there been so much accomplished in this direction. The Section is fully of the opinion that

our literature fails to receive much that ought to be recorded. It is probably within the knowledge of every member of this body that facts, principles, theories, and incidents of much value never see the light through the medium of a written or printed page. There are various reasons for this. Some—yes, many—excuse themselves for supposed or real want of ability to write; a few attach very little importance to their own productions; others fear to run the gauntlet of criticism that is sometimes used with undue freedom and too often with unreasonable severity. How often is the statement made that the larger part of our literature is trash, and not entitled to any special consideration. Indeed, it has been said, "far better that all the books we have were destroyed, and that we should begin anew." Such criticism certainly is not calculated to increase the number of those who would add to our literature.

In calling attention to the work that has been done on behalf of our profession for the past two years, the attempt will not be made to occupy all the ground, nor to include all that has been done. The province of such a report as it is practicable to make here is not to select that which the Section thinks most valuable, or of any importance, and present that and that only for attention and consideration, thereby intimating that that which is not in the report is worthless. No committee that could be selected would be competent for such a task as this.

In regard to our periodicals, they continue, with some modification and changes, in much the same channel as heretofore. The leading ones have exercised more care both as to matter and the manner of presenting it. A question in reference to our journals that is worthy of some consideration is that of specializing their work. Hitherto they have each attempted to cover all the fields of our science, art, and education, and whatever in any way relates to the profession. Once it was quite sufficient to embrace every branch or particular in one volume, as for instance, Fitch's "Dental Surgery," and the earlier editions of Harris's "Principles and Practice of Dental Surgery." Now, the expansion and more thorough cultivation of each particular division gives rise to the demand for a volume for each, and so we have Dental Anatomy, Dental Pathology, Dental Materia Medica, Therapeutics, Operative Dentistry, Oral Surgery, etc., etc. Every one recognizes this as the natural and necessary outcome of the progress that has been made as time passed on. It is true, perhaps, that our periodicals could not, for a time at least, be specialized as our book literature has been. Still it is practicable

to do something in this direction. In the medical profession the periodical literature has, during the last ten years been more and more specialized; for example, there are surgical, pathological, ophthalmological, obstetrical, and therapeutical journals, etc. Two years ago the American Medical Association established a journal that should be its exponent and medium of communication. The *Journal of the British Dental Association* is a periodical devoted in the main to the interests of the association whose name it bears.

These facts show the trend of the minds of some, at least, on this subject, and there are indications that still further division of the subjects in the way of journalism will be brought forth in the near future. A question which may be properly considered here is, to what extent and in what way is the specializing of our periodical literature practicable or desirable? It may not be easy to promptly and fully answer this question. It would seem practicable to have one or even two journals in this country devoted to the interests of association work—dental societies; one or more to the subject of professional education, including college work; one to oral surgery, operative dentistry, oral deformities; one to prosthetic dentistry, including metallurgy and chemistry; one to dental pathology and therapeutics. Thus far it would seem entirely practicable, and probably a further division would be found desirable in the future. Some benefits and advantages would certainly accrue from such a division of subjects by our journals. It would bring together in one place the matter pertaining to any given subject; it would necessarily render the consideration of each department more thorough and extended than it is now found to be; it would separate the subjects and make each one to stand out prominently and so receive more attention; it would give an individuality to each periodical that it does not now possess; it would make each one take up such particular work as would be more valuable to the profession; it would remove all occasion for objectionable competition: indeed, each one would become an aid or support to every other. The better and more progressive part of the profession would feel it necessary to have a journal for each special or particular branch.

The future of our journalism is one of the important subjects for consideration by the profession. It cannot remain upon a level; it must make progress or it will go backward. The labor of making such a specialization as is here indicated must necessarily in a large measure devolve upon those of our profession engaged in the work, but an expression from the profession at large or its representatives can-

not be without much influence upon those conducting our journals. Though most of the journals have made progress in the last two years, it has not been so marked as to call for any special notice here. We may, however, refer to the fact that about a year ago the *Missouri Dental Journal* ceased, and following it arose the *Archives of Dentistry*. This journal has for its leading editor Dr. C. W. Spalding, of St. Louis, assisted by a corps of able co-editors. It is one of the independent journals, of which there are but three in the country, according to their own claim.

In our textual literature there have been quite a number of new editions issued during '82 and '83. Prominent among these we may mention "A System of Oral Surgery," by Prof. James E. Garretson. This treatise has, from the beginning, been regarded as one of the standard works of our profession upon the subjects which it em braces. Its title gives an indication of its character. It treats mainly of the diseases, surgery, and treatment of the mouth, jaws, face, teeth, and parts about them. This, the third edition, is enlarged, several new chapters having been added on subjects not before included; seventy-five illustrations have been added, and the matter has been in some respects re-arranged, much of it re-written, and some parts condensed and simplified. So much has been done, however, as to make the present volume much larger than the one preceding it. This is a very valuable work to the profession, as it treats fully, and up to the present time, of many subjects that are imperfectly dealt with elsewhere. Indeed, its presentation of the surgical subjects within its scope is more practical and more thorough than that of any work upon general surgery, and on this account it is sought by and is very valuable to the general surgeon. This treatise, perhaps more than any other, forms a connecting link between the dental and medical professions, and has done, and is still doing, more to bring them together than any other work. Dr. Garretson's views, as is well known, differ in some particulars from those of many others in the profession; but in a report of this kind it is not practicable nor desirable to enter into a controversy upon points about which there is such a diversity of opinion. We will only here venture the suggestion that perhaps the work is rather overloaded with a presentation of cases: three or four cases are sometimes given for the illustration of a point which would be established quite as well with one. We would further suggest that if another edition is to contain the present matter with additions, it would be better to make two volumes instead of one as heretofore.

The second edition of "A Manual of Dental Anatomy, Human and Comparative," by Chas. S. Tomes, M.A., F.R.S., made its appearance in 1882. With the first edition of this work the profession is well acquainted; the second contains all the excellences of the first, with a very considerable addition. The matter has been revised and corrected so far as it required it, and some new matter added. The chapter on dental tissues has been for the most part rewritten, and many new illustrations have been inserted. This book does not cover the ground, nor take the scope of that of Owen, but for the student and for him whose studies must necessarily be limited, this is the best work extant upon the comparative anatomy of the teeth, and it should receive the careful attention of every practitioner.

Early in this year a new work appeared from the pen of Professor F. J. S. Gorgas, of the Dental Department of the University of Maryland, entitled "A Manual of Dental Materia Medica and Therapeutics for Practitioners and Students." This is the first work upon this subject, of any considerable pretensions, issued in this country. It is one that has been long needed by the dental profession, as has been evinced by frequent inquiries for such a treatise, and numerous requests that it be prepared. While works on general materia medica are valuable to dental practitioners, they are not of the same service as a special work which presents and describes the agents and materials used in dental practice. Professor Gorgas has enjoyed a training as a student and a teacher that has eminently fitted him for this work. "While he claims the credit of the compilation, he does not claim originality in the sources of derivation, medical properties, and action of the various articles of dental materia medica which are given in the work. His intention has been, not alone to present his own ideas as to the particular application of remedies, but those of well-known and acknowledged authorities as well, and in such a manner as may be of service to the dental student in acquiring a knowledge of this important branch of the profession; hence, nothing has been presented in this work that in the author's opinion is not applicable to dental practice, or that will not be of benefit to the dental student."

A volume on this subject, prepared by Mr. James Stocken, L.D.S., of England, has been before the profession for several years. It has passed through three editions and has served a valuable purpose, but it has often been suggested, recently, at least, that a work of still wider range was demanded, and to this Professor

Gorgas has devoted himself for some years past. This treatise will doubtless in future editions receive changes, improvements, and additions. One seeking points for criticism may in this, as well as in every new work, find points upon which to dwell. No work perhaps has ever been written that is altogether above criticism. There may be important things omitted from this, but it occupies as wide a range, and covers the ground as fully, all things considered, as could be expected in a new work. It will be of great value to every dental practitioner, and especially to the dental student. Its points of excellence can be best understood by a thorough perusal. The points open to criticism need not be mentioned here, as there seem to be no radical errors with reference to which caution should be excited. The omission to mention and fully discuss some remedies of recent introduction but not yet fully established in use is a matter for which the work should not be hastily condemned. The volume is one certainly worthy of the attention of every practitioner who would keep up with the literature of his profession.

We have in this report only noticed three or four works issued during the last year that seemed to call for some note. There are a number of others equally worthy of notice, perhaps, to which reference may be made in future reports, but of which time now forbids mention.

DISCUSSION.

Prof. MAYR: During the last few years, I have been receiving dental journals from probably all countries where any such are published; and I think some of the gentlemen present would be glad to hear what they are like.

I receive two journals published in France, and you would be amazed at the small amount of original French intellectual food that is offered to the French dentists. Nine-tenths of all the matter in those journals consists of translations from American journals. I don't think I have found one single original article of any value in the last two numbers of the French journals.

The big empire of Austria, with its 39,000,000 of inhabitants, has not one single dental journal. I have not been able to get hold of an Italian journal. I received one journal from Valencia, Spain, published "with the approbation of the Bishop." The journal consisted of eight pages and contained a report, approved by the bishop, about a meeting that had been held, and a clinic of little value, and

something very rudimentary concerning dentistry. That was all it contained. There are some journals published in Cuba, and the other day I received one that was a real live journal. It was as good as many American journals, and contained very readable articles. Concerning the German journals, I said two years ago that they were not very progressive. I was badly pitched into in Germany for that, although I think I was correct then. Since that time, it seems to me that they have immensely improved. They have quarterlies containing reports of societies; and they also contain a large number of original articles. They are very voluminous, but the price is within the reach of almost anyone. There are two English journals which I receive here. One of them reports the dinners eaten by the dentists of England. The other is quite interesting, and contains scientific food. I have also received a specimen copy of a Russian journal. The specimen copy was promising. I made it out with much consultation of the dictionary and hard labor. I found it to contain nothing of special interest, mostly legal squabbles.

Dr. TAFT: There are three journals in England.

Dr. FRIEDRICHS: I think the speaker slandered the French journals when he said they contained no original articles.

Prof. MAYR: *Scarcely* any!

SECTION IV.

Operative Dentistry.

Report by EDWIN T. DARBY, Chairman.

SECTION IV., in making its annual report, has no papers to present for the consideration of the Association. The year just passed has not been celebrated for the advent of new theories, nor have we been startled by new discoveries. It is true that the inventive minds in the profession have developed some new devices or modes of practice, which may or may not be valuable additions to those already in use.

There are one or two at least which it may not be unprofitable for this Association to consider. First, the new methods of packing or consolidating gold in the cavities of teeth as recommended by by Herbst, of Germany. Perhaps many of you are familiar with his method. He professes to introduce and consolidate gold by means of revolving smooth instruments with far greater rapidity than can be done by other methods, and with less pain and inconvenience to the patient.

The following letter has been forwarded to me to be read in this connection:

"New York, May 7, 1884.

"My Dear Dr. Rehwinkel:

"With this mail you will receive some filled teeth sent to me from Bremen by Dr. Herbst, who requested me to send them to you. I have exhibited them to all societies in this vicinity, else I should have sent them to you before this. Please show them before the American Dental Association at Saratoga, where you may split the teeth filled with gold and examine the walls of the same; but I would like to have them sent back to me in the fall, as I would like to examine the walls with the microscope. The external appearance of the fillings is first-class, and I believe this method for certain cases has a great future.

"I remain, as ever, very truly yours,

"C. F. W. Bödecker."

The electric or incandescent lamp and its uses in dental practice is another subject which the Association may find profit in considering.

The combination of gold with other and baser metals is not new in theory or practice, yet an expression of opinion as to its advantages, if any, may not be a waste of time.

Another theory, which has received a good deal of attention in one of our State societies may not be unprofitably considered here: the danger of excessive dryness and consequent contraction of dentine and enamel, where rubber-dam and hot-air syringe are used. The theory is that as soon as the tooth becomes wet again there is an expansion of the tissues.

DISCUSSION.

Dr. ATKINSON: I have an excerpt here from a letter received from our esteemed brother, C. F. W. Bödecker, in which he says, "I have seen Herbst, and from him learned a great deal of his method, which is really the most valuable invention that has ever been made in Europe or America, but the profession in this country are ignorant of the fact.

"I shall, when I return, bring with me a collection of teeth, about one hundred, filled by Herbst, which demonstrate the applicability of his method. At the next clinic of our district society I shall demonstrate his method in and out of the mouth. The most difficult cavities in this way are the easiest, and can be made absolutely perfect in a quarter of the time required by any of the other methods. Please announce the fact to the profession, so that we will have a full attendance at the next clinic.

"I have been with Herbst all the week, working like a beaver, and know what I am talking about; for what I have stated is no exaggeration, and when I see you and show you the principle you will approve it and adopt it."

Dr. ABBOTT: I would state that I have seen the teeth referred to, and they certainly have the appearance of being very perfectly and very nicely filled. The process, as I understand it, is to use an instrument that has a little bulb upon the end, for the introduction of the gold, of a size in accordance with the size of the cavity to be filled. The gold is introduced, and this instrument, being run with the engine and whirling rapidly, is pressed against the gold. The explanation is that it condenses the gold sufficiently, and makes

the filling in the way described. I saw one tooth broken apart, showing the cavity on one side and the filling on the other. The filling fitted the cavity very perfectly. Whether they were finished in that way in the mouth is a question that naturally arises. I understand Dr. Bödecker's statement to be that they were filled in the mouth just in that way. As to the advisability of filling teeth by this method, I would hardly even offer a suggestion. I should rather doubt the probability of my being able to do it. Still, one never knows what he can do until he tries. The instruments are very highly polished. I have for a great many years used an instrument, a burnisher that was made in the shape of a tomato, for the purpose of condensing the last pieces of gold upon the surfaces of the fillings. I use that almost constantly in large cavities. It condenses the gold more thoroughly than it can be done by hand or with the ordinary plugger.

Dr. R. Finley Hunt: I would like to ask whether this method of filling is intended for cohesive or non-cohesive gold.

Dr. Abbott: My impression is that the gold used was cohesive. I would not state positively, but that is my impression. I don't know what thickness it was, or anything about it.

Dr. Daboll: Dr. Miller, when in Buffalo, stated that at Dr. Herbst's request he filled several teeth himself, in Herbst's office. The gold used is soft. Dr. Miller also stated that in Germany they prepare a gold that is as soft as anything we have, if not more so.

Dr. Friedrichs: You mean cohesive gold?

Dr. Daboll: Not cohesive gold at all; non-cohesive gold. The contour cavities are filled by the aid of a matrix that is made of a thin substance and held in position by the use of shellac. He introduces the gold in large masses, and does that uniformly, if the cavity is large. He proceeds without retaining-points, or anything of that kind, and works rapidly,—so rapidly that Dr. Miller said he filled a large cavity in ten minutes. He said that, as nearly as he could judge in the short time that he had, and with the tests that he could give, he thought the cavity was filled quite as well as by any other method, and was entirely moisture-proof. He also said that he tested it with aniline, and thought there was very little leakage, if any. He said he was unable to observe any in several specimens which the doctor had given him. While he was not prepared to indorse the system, he said that it was certainly ahead of anything he had ever seen for the rapidity with which teeth could be filled.

Dr. STOCKTON: We have a gentleman from New Jersey here, Dr. Timme, who has had considerable experience in this line.

Dr. WATKINS: Dr. Timme has stepped out and will not be back this evening. I will say, in his absence, that when he was in Germany he was very much interested in this method. He used a set of instruments, such as they use there, which are burnishers of different shapes, mostly running to small points. They are cone-shaped, and are to be run in the engine. The gold used was that prepared in Germany, and imported by himself. This gold is similar to that made by Mr. Williams, which he terms electric gold. In January, Dr. Timme gave a clinic at which he filled a large cavity in a lower molar, using the revolving instruments from beginning to end of the operation. To all appearances the filling was well condensed and put in as nicely as it could be put in by any other method; and it was perhaps put in more quickly than it could have been with other instruments. The doctor claimed that he was not an expert at all, and had had very little experience in that mode of operating. However, when it was completed, it was a very nice filling. Last February Dr. Bödecker filled a tooth for me, using the Bonwill mallet for the principal part of the operation. About the last sixth of the filling he put in with a bloodstone burnisher, and the latter part of the operation seemed just lovely in comparison with that in which he used the mallet. It did not seem to cause any strain at all on the tooth, and it has the appearance of being perfectly condensed, just as much so as it could be, I think, with any mallet. I have tried this method on a small scale myself, in the way of burnishing gold down with an agate burnisher. I frequently, where I have been working upon a large cavity, after getting the cavity a half or two-thirds filled, use a strip of gold about No. 30, or No. 4 folded to about thirty-two, well annealed. This I lay on the surface and burnish down. I think you would be surprised to see how dense that gold becomes with but little pressure, and also how strongly it coheres. You will also find the agate burnisher a nicer instrument for burnishing the surface of fillings than one of steel. The agate does not seem to break the edges of the cavity as steel would when it comes in contact with them.

Dr. BARRETT: I have had only a limited experience with this method, but there are some things that I can say about it. The gold used is the most non-cohesive that I have ever seen. I have not succeeded very well with the gold that we get here. This method, like any other, requires considerable practice before one can acquire

the expertness of manipulation which enables him to succeed; but I have experimented enough to satisfy myself that with the proper kind of gold, especially with the Wölrab gold, you can burnish it down until it seems as though it was as perfectly united as you could conceive cohesive gold to unite. The instruments that are used, as far as I have seen them, and I have used some that came directly from Dr. Herbst, are smooth, but not particularly polished, and have extremely small points. They may become plated with gold in using, and it is Herbst's practice to keep upon the operating-table, by the side of his gold, a piece of block tin upon which to remove the plating of gold which is formed upon the surfaces of the instruments. The gold used is in the shape of cylinders, and the cylinders, I believe, as Herbst prepares them, are of different sizes.

Dr. A. O. Hunt: Immediately following the publication of the translation describing the Herbst method of filling teeth, I also procured a set of instruments and made some experiments with this method out of the mouth.

The difficulties to be encountered are many. Still, they lessen when one understands the principle and uses the proper instruments and gold. The first trouble I experienced was in the use of the large cylinders or pellets of gold for starting the filling. It has been my custom to use smaller ones, or ribbons, so that when I came to double or treble the amount it was very difficult for me to manipulate it. But I could not in any other way succeed in keeping the gold under the burnisher or plugger. After curling up and wabbling about for awhile it will finally find a lodgment. As soon as this is accomplished it is very much like working gold by present methods; but there is a tendency to ball up or form little hummocks.

To give you an idea, as nearly as I can, of what the condition of the instrument ought to be,—those I have are made like a burnisher with a highly polished surface. They readily plate with gold and while thus coated do not give good results. To remove it I used the best material I had at hand, which was fine emery cloth, perhaps finer than 00. By rotating the instrument over this, all the accumulation of gold is taken off, and then when the instrument is used on the filling it works very well. Dr. Barrett speaks of block tin. I did not know that Dr. Herbst used that. Dr. Abbott refers to the use of the corrugated burnisher as a final condenser, as in other methods. In the published articles it is stated that this burnisher or plugger is not held continuously on the gold, but

used with a rapidly interrupted motion. When the burnisher is running as rapidly as it can be run, with an interrupted motion of your hand you get better results, which answer to the principle of a corrugated burnisher striking on the gold as it rotates. I have made experiments with various forms of gold, all of them soft, as I understand it should be. I have used the fine No. 4 grade of White's, Williams's, and Valleau's manufacture. I see no particular difference in them, except that the "1000 Fine" works a little easier and does not quite so readily form the hummocks which have been mentioned. After the foundation of the filling is firm it is not a difficult matter to build up the foil, using a small quantity each time and running the engine rapidly. A larger quantity must be used in the beginning in putting the gold into the cavity; the difficulty of securing the first portion of gold is very annoying until you get accustomed to it. It requires a peculiar knack. So far as the matrices are concerned, I do not see that it is absolutely necessary that they should be used, but it is very much more convenient to use them. You can contour a filling without a matrix, but of course you will readily understand that with your instrument rotating very rapidly, the danger of its dodging from right to left and up and down is considerable. I tested the cohesive property of the fillings by various experiments,—breaking away the walls of the tooth, and then with a chisel pressing the gold in the opposite direction from which it was impacted. I then with a sharp chisel cut across what would be the lamination of the gold, and I found in the teeth I filled —after the first few—that each time I succeeded in getting a better cohesion, and I am satisfied that, if we could have a thorough demonstration of this method by experts, many could use it to advantage. That there are merits in this method I am thoroughly convinced.

Dr. Crouse: Why is a rapid motion better than a slow one? Does it heat the gold enough to make it cohesive?

Dr. Hunt: No, sir, I should judge not. If it should do that, it would cause an unfortunate condition of things in the tooth. You will remember that I said I did not hold the instrument continuously on the foil, but used it with an interrupted motion to avoid the heat which would be caused by friction. Pure gold, if the surface is clean, will cohere by pressure alone.

Dr. Crouse: It has been suggested to me that the gold was annealed by the rapid motion.

Dr. Allport: I see just fascination and good enough in this method to create a desire to adopt it, and I see just evil enough in it to make a great deal of trouble, if it is generally adopted in our practice. When plastic gold came into use, nearly everybody went crazy after it. I was appointed one of a committee to investigate its merits and report to the Association. As perhaps some of you will remember, that report did not encourage its use. Some of my friends were very much inclined to the use of it. I remarked to them, "The less of it you use the better dentists you will be considered five years hence." I can foresee that many will be inclined to adopt this method, and I feel that unless we do something to counteract it, a great deal of mischief will be done, and I wish to raise my voice against it. The trouble is not going to be with the packing and welding of the gold in easily accessible cavities, but in general practice it will be impossible to so adapt the plug to the walls of the cavity that leakage will be prevented. In every specimen tested by Dr. Bödecker, he said he discovered a slight leak. I believe you can never get over that difficulty. The principle involved is wrong, and although in a few cases saving fillings may be made by this method, in general practice it will prove a failure, and the less encouragement we give it the better.

Dr. Barker: If the gentlemen who have experimented with this method are correct, there is certainly a new principle involved in it. If with a burnisher you can pack non-cohesive gold so that it will cohere, or, in other words, make an absolutely homogeneous filling, then I have learned something new. If that is true, it will not be necessary to anneal foil in order to make it cohesive. It matters not, as I understand it, if the method is based on sound principles, whether we use the burnisher by hand, or in rapid rotation with the engine, the effect produced in the one case will be the same as in the other.

Now, I do not call in question the statement of any gentleman on the floor; but in order to be convinced that an absolutely homogeneous filling can be made by this method, I shall require to see it done. I certainly agree with the gentleman last upon the floor, that the general use of this method would probably be very unsafe.

Dr. Clark: Some time last winter I listened to a paper upon this subject, read by Dr. Fillebrown, of Boston, and determined to try the method. I procured the gold that was recommended in the paper, and my experiments resulted in some bad failures. Then I did what ought to have been done in the first instance,—thought the

matter over seriously, and found that this method was similar to one in use thirty or forty years ago; that history was but repeating itself. I then referred back to a great many fillings that I had put in at that time with round, blunt points. They were considered good fillings then, and I often wonder how I put them in. I don't believe I could do it now. I think this practice is pretty nearly a revival of that. At the time I refer to, the manufacturers made a soft, velvety foil that we cannot get now, as I found in my recent experiments that the best soft foil that can now be had is not equal to that formerly used. I fully agree with what Dr. Allport has stated, and believe this thing will be productive of a great deal of harm unless we confine ourselves to a certain class of cavities, which can be filled very easily with almost any gold. I object seriously to using cohesive gold in body-fillings, because I am very fearful of pits made by our serrated instruments. I believe these instruments cause more leakage than we are aware of, and more than we are apt to create with round points. I believe very few of our first-class fillings, put in with cohesive gold, will bear microscopic investigation. We did not attempt to build out teeth forty years ago; but many of you can remember the smooth, wedge-shaped instruments for use between the teeth, in filling cavities of a certain kind. Some very good fillings were made in that way; and the same principle was followed then that I think is recommended now.

Dr. Rhein: I was present when Dr. Bödecker filled the tooth for Dr. Watkins which has been mentioned. I think the bloodstone burnisher is better for burnishing in gold than the Herbst instruments. Most of those who saw the operation were of the opinion that the friction of the instrument upon the filling-material caused the gold to anneal; it certainly made heat enough, and thus caused the gold to become a homogeneous mass, and Dr. Bödecker was of that opinion at the time. One point that is important is in regard to using this method in a cavity in the neighborhood of the pulp. I should think it would be painful. Dr. Watkins said that he felt nothing at the time of the operation, but this might be explained by the fact that the filling was nearly completed before this method was tried.

Dr. Watkins: I rose to my feet before Dr. Rhein began to talk with the intention of saying that the gold used by Dr. Bödecker was Kearsing's gold, and that each piece was annealed.

SECTION V.

Anatomy, Histology, and Microscopy.

On Certain Disputed Points in the Development and Histology of the Teeth.

Paper by J. L. Williams, of the Section.

Mr. President and Gentlemen of the American Dental Association: The one thought which has been uppermost in my mind since the chairman of Section V. invited me to read a paper at this time has been in the form of a query, whether there would really be sufficient interest in this subject, on the part of the Association, to warrant my occupying the necessary time to present the theme. Perhaps I ought not to have been troubled with such misgivings, but while it affords me a genuine pleasure to present to the profession the results of my labors in this direction, yet I think those matters which have a direct relation to the details of our daily office practice have a more decided interest for the most of us, and I have no desire to force myself upon an unwilling audience. I must conclude, however, that if the dental profession desires to know anything concerning this subject, it desires to know the truth; and the fact that I have been charged by those holding high positions as teachers with theorizing somewhat upon these matters and making statements which are not supported by facts is, in itself, perhaps, sufficient reason for my desire to present such evidence as I have in support of my position before the representative dental organization of the world. I shall therefore take up only such points in the history of the development of the teeth as are in dispute at the present time.

It would seem hardly necessary for me to disclaim any feeling of animosity or antagonism for the sake of disputation alone. I suppose I possess a certain amount of that intellectual pride which is common to humanity, and from which springs the gratification arising from the belief that the opinions which we hold are correct,

yet I am certain that I would trample such pride in the dust instantly if I saw that it stood in the way of my acceptance of the truth. I must assume that my highly-esteemed friend, Prof. J. E. Garretson, and others who have criticised my views are equally desirous with myself of knowing the truth; and while I suppose their belief in the certainty and security of their position has been productive of a feeling of magnanimous commiseration on their part for me, yet, if I have not completely lost all ability to interpret facts and perceive truth, I shall to-night present such evidence of the correctness of what I have previously said upon this subject as shall place my position beyond all possibility of disproof or doubt.

This subject is one which must depend largely upon illustration for its intelligent presentation. This being true, there appears the possibility of the imagination of the artist entering as an important factor in the work of illustration. This becomes especially important when there is great difficulty in tracing the continuity and relation of tissues. We have a striking example of this in Dr. Abbott's chart representing a section of a central incisor with its surrounding tissues. In this chart the odontoblasts are represented as round or oval plastids or cells, between which the dentinal fibrillæ pass to a connection with non-medullated nerve-fibres,—an error which has arisen from the extreme difficulty of preparing specimens in which the continuity of the tissues can be traced. This led me to look for an artist in whose illustrations there should be an absence of all sentiment and imagination, who should be no respecter of persons, and the truthfulness of whose work no one should dare question. In the pure sunlight of heaven, whose swift pencils wrought many of the illustrations which I shall present to-night in a space of time not exceeding the interval between the diastole and systole of a human heart, I found the agent to do my work. While the possibilities of photography are limited, within that limit there is nothing but the truth pure and simple. The photo-micrographs presented to-night were all made from actual sections cut from the jaws of human and animal embryos. The sections from which the photographs were made will be placed under the microscope for your examination after the reading of the paper. I invite the most critical examination of these slides, knowing that the more critically they are examined the clearer will appear the elucidation attempted upon the screen. In fact, I desire to depend upon what shall appear upon the screen only so far as is necessary to make plain what can really be seen under the microscope. I must add just a few words

about the quality of the photo-micrographs. They were made without either a heliostat, substage, or a bull's-eye condenser, all of which accessories I should have had, but could not procure them in time for the work. They are not, therefore, quite as sharp and brilliant as I could wish, but perhaps sharp enough to prick some of the imaginative and "philosophical" bubbles of my critics. I have here on the desk before me a reprint from the *Dental Practitioner*. The title of the paper is "Development of Enamel Similar to other Epidermoid Structures." The paper presents a ludicrous and also a sad aspect. Ludicrous, in that the accidents due to a lack of skill on the part of the gentleman who mounted the specimen from which the drawings were taken are made to do duty as an explanation of a preconceived hypothesis which never had any foundation in fact. Sad, in that so little is really known concerning the histo-genesis of the teeth; that it is possible for a man to present such a paper as this to the profession without ruining his reputation as a histologist; and more lamentable still is it to find this dignified nonsense indorsed by the president of the Philadelphia Clinical Society, "an expert pathological and histological microscopist, and a gentleman whose learning and scientific attainments will not be questioned," says the author of the paper; all of which may be true as applied to the gentleman in his legitimate sphere, but the little that appears in this paper contains evidence that his opinion concerning the formation of enamel is of no value whatever.

During the discussion following the paper which I read before the New England Dental Society, at Providence, last October, it was privately remarked that it really was a matter of little importance whether this theory or that of the development of the teeth were true. It would probably be entirely out of place for me to discuss that question here. I must believe that gentlemen who travel the length and breadth of a continent to confer with each other concerning what is latest and best in the thought and practice of their chosen profession do regard this subject as one of the important foundations upon which the scientific status of dentistry rests. The man who does not admit this has a very narrow and dwarfed conception of the possibilities of modern dentistry. Do you think Dr. Atkinson would have dared undertake that brilliant operation which has resulted in the union of several fractured teeth, but for his knowledge of the minute structure and functions of the tooth-pulp? Most assuredly not. Under all circumstances, the man who is master of the situation is the one who best understands the nature and

resources of the material which he has in hand. This being admitted, then it is a matter of vast importance that we know who is right and what is true about tooth-structure and development. It is a matter of importance that students should be correctly taught concerning these subjects.

It is the object of this paper to point out four important fallacies which are taught at the present day concerning the development and structure of the teeth. To this end I shall demonstrate that the teeth are not developed as papillæ in a groove; that there is an enamel-pulp or organ which has a definite function; that the formation of enamel is from the line of its union with the dentine outward, and that the odontoblasts are of the nature of ganglionic elements, sending processes outward into the dentine, backward into the substance of the pulp, and probably also laterally connecting them with each other. In answer to the query why these points have not been established before, I can only say that the subject is an exceedingly difficult one to investigate, and, so far as I know, the specimens which are presented for your examination to-night are the first and only ones which have ever been produced showing the natural relations of all the dental tissues to each other and to their surrounding tissues without break in their continuity. It has cost me years of study and experiment and the expenditure of hundreds of dollars to accomplish the work the results of which I am to show you to-night. You will pardon me, therefore, for my disposition not to readily yield what this long course of study has taught me to those who pin their faith to "philosophical" deductions, or a few worthless microscopical specimens sent them by some commercial dealer. The fact that I have already criticised Prof. Garretson's hypothesis of the development of the teeth, and that the author of the paper referred to is chief of the clinical staff of the Hospital of Oral Surgery of Philadelphia, of which Prof. Garretson is the surgeon in charge, leads me to believe that this brochure is in the line of a defense of Prof. Garretson. The photo-micrographs at hand enable me to refute the teaching of Prof. Garretson and others, that the teeth are developed as papillæ in a groove, which is called the "primitive dental groove," in a much more effective manner than I was able to do in my review of his address in the *New England Journal of Dentistry*, and the more recent series of articles in the *Dental Cosmos*. As an evidence that I desire to render full and complete justice to Prof. Garretson and my distinguished opponents, I propose to present photo-micrographs which I think I may safely

claim are equal, if not superior, to any illustrations which have ever been produced in support of their hypothesis. I shall first, then, proceed to show you actual photographs of sections of the jaws of human embryos, which present the "primitive dental groove" of Prof. Garretson and the older writers with diagramatic clearness.

You have on the screen (Plate I., Fig. 1) a photograph from a section cut through the face of a human embryo at about the eighth or ninth week of intra-uterine existence.

Here we have the "primitive dental groove" in which is seen the developing tooth-germ with the so-called "tunica reflexa" about folding over it, leaving the space in which the enamel is developed. Does it not seem to be a perfect illustration of the hypothesis? It may be a "thing of beauty" for the moment to those who have fondly cherished a belief in a "primitive dental groove," but it certainly is not destined to be a "joy forever." The photograph is from one of the first specimens which I prepared, and was mounted several years ago. Every process in its preparation was carefully conducted according to the authority of "the most celebrated and expert slide-makers of Europe," and with what results? Why, all of the delicate superstructure above the so-called "basement membrane," including the enamel-pulp, was destroyed, leaving the appearance as shown. The slide possesses no value whatever. I say no value; but perhaps it may be said to have an historic value, in precisely the sense that the implements of the stone age, while possessing no intrinsic worth, yet have an historical value, as showing the benighted condition the race was once in and the progress which has been made since that time. Let me now call your attention to photo-micrographs taken from specimens mounted after different and better methods.

This view (Plate I., Fig. 2) shows the first observable differentiation which marks the commencement of the process of dentition. In former papers upon this subject I have said that "if an imaginary line be drawn through the cuboidal layer of epithelial cells directly over the position which will be occupied by the future jaws of the embryo, it will represent the first observable indication of the development of the teeth. These cells, in obedience to the law of typal requirement, begin to proliferate and increase rapidly in size. This growth forces the columnar layer downward and the flat layer upward. This upward bulging forms a band running around the entire surface of the jaw, and is the *bourrelet* of Legros and Magitot, while the downward curving of the columnar layer gives, in

transverse section, the V-shaped appearance," as shown in this photograph.

The removal of the delicate embryonal layers of epithelium by the older methods of preparing specimens leaves the "primitive dental groove" as shown in the preceding illustration. From the inside of this band there grows downward or upward, as the case may be, a thin lamina, from the free edge of which arises the epithelial cord, which, penetrating deeper into the substance of the jaw, enlarges at its lower extremity, forming the enamel cap within which is developed the enamel-pulp. I wish to compare this photograph with the illustration which will follow upon the screen, for the purpose of demonstrating that in point of fact and principle I have shown nothing in my drawings which may not be seen in the photographs from the specimens. (Photographs were then shown of illustrations of former papers by the author in the *Dental Cosmos*.) And now, just a few words concerning the enamel-pulp or organ before proceeding to review the paper of which mention has already been made. The existence of this important feature of a developing tooth is denied by Prof. Garretson and others, for the reason, I suppose, that their hypothesis makes it necessary that there should be no enamel-pulp.

Gentlemen, the view on the screen (Plate I., Fig. 3) speaks a hundred times more effectively than any arrangement of words, and forever sets at rest this question of an enamel-pulp. This is a photo-micrograph from a section through the jaw of a human embryo, showing the development of a temporary molar. You will observe that the enamel-pulp is, in accordance with what I said in my review of Prof. Garretson's address at Providence, the largest and most conspicuous feature of the tooth-germ in its earlier stages.

As I shall refer to this subject again, I leave it for the present, while I give a few minutes' attention to the paper to which I have already referred. This reprint is largely composed of quotations from different authorities, with comments upon them as to the manner in which hair, skin, hoofs, and horns are formed; an extract from Legros and Magitot; the views, to the extent of half a page, of the expert microscopist already referred to; a brief comment on one of my drawings taken from the *Dental Cosmos*, and a little more than a half page by the author on the formation of enamel, the subject proper of the paper, and the most of this half page is a description of a drawing made from a slide mounted by Cole, of London.

Assuming that the drawing is a fairly good representation of the slide, it is of but very little value, and the description shows a ludicrous misrepresentation of the little that really can be seen. It is a favorite method with many dialecticians who find a weak cause on their hands to defend, to assume, in a few skillfully arranged sentences, that the hypothesis which they are trying to establish is similar to or identical with, in its relation of principles, some other well demonstrated and generally admitted theory. The most of the time occupied is consumed in dwelling upon the major premise of the argument, which may be nearly or quite self-evident. The mind of the reader or listener is forcibly impressed with the truths presented, and then the minor premise and the inferences or conclusions are rushed in with the flourish of a few well-rounded sentences, and the hearer is overwhelmed before the mind has had time to recover its critical equilibrium sufficiently to see that there are several missing links in the argument. It is a kind of logical trick similar to those with which the Greek school of sophists were wont to amuse themselves. This is quite the case with the paper of which I am speaking. The scheme of argument presented in this paper might be stated as follows: Hair, nails, hoofs, and enamel are epidermoid structures. All epidermoid structures are developed in the same manner. Ergo, the process of the development of hair and enamel is identical. Now, the weak point in the argument arises in the minor premise, which asserts that all epidermoid structures are developed in the same manner, which is very far from the truth. Scales, hair, feathers, nails, horns, hoofs, the enamel of the teeth, the sweat-glands, the sebaceous glands, and the mammary glands are all derivatives of the epidermis, but they are not all developed in the same or even in a similar manner. I have frequently urged the importance of some knowledge of comparative embryology in the study of these formative processes. It is impossible to grasp in a rational manner the significance of the intricate unfoldings in the evolution of the higher forms of animal existence without having studied these processes as expressed in a more simple manner in the lower forms. It would be well for these gentlemen, who discourse in a very general way with such a show of profound learning about my reversing the formative processes, disregarding the general physiological laws, and dragging in a divine interposition, to at least give some little attention to the rudiments of these laws themselves, and ascertain, if possible, what they are talking about. There is something about the expression, "a general physiological law,"

which makes it a delight, to men who have only a scanty definite knowledge of a subject, to roll it as a sweet morsel under the tongue. A vast amount of ignorance has many times concealed itself behind "a general physiological law." A little definite knowledge at critical moments is of vastly more value and importance than volumes of brilliant generalizations, which may mean anything, but generally mean nothing.

The ostensible title of the paper in hand is "The Development of Enamel Similar to other Epidermoid Structures." The author would have succeeded much better if he had stuck close to his text. But on page 6 of his reprint, and also on the tenth page, he emphatically declares that the law governing the formation of hair, nails, the cuticle of the skin, the shell of the turtle family, the hoofs of ungulates, and the horns of most of the ruminants, is precisely the same law which governs the formation of the enamel of the teeth. Now, that is precisely what it is not. How any man of sound mind, with healthy, active reasoning powers, could honestly assume that a tissue which is constantly being thrown off and replaced by new tissue—which, when lost, is replaced by a new growth, as is the case with most of the epidermoid derivatives—can be identical in its process of formation with a tissue which never grows after its typal limit is reached, which is never replaced when lost, is quite beyond my powers of comprehension. I might enter into an elaborate argument to show how utterly impossible it is on *a priori* grounds for the development of enamel to be identical with the formation of hair, but it is much the better way to come straight to the demonstrated facts.

You have on the screen (Fig. 14) a photograph of the drawing in the brochure under consideration, made from the slide mounted by "one of the most celebrated and expert microscopical slide-makers in Europe." It is upon this drawing that he depends for the demonstration of his hypothesis. Now, what are the facts concerning it? It is worse than useless, in the sense that a perversion of truth is worse than the absence of truth. It is misleading to one who has not had experience in the preparation of sections of embryo jaws. It purports to be a section showing the temporary and permanent tooth-germ. The germ of the permanent is entirely absent, as is the enamel, with the exception of a few fragments which were formed on the dentine of the temporary tooth. These portions were probably torn out in the cutting of the section, or washed out in its preparation for mounting. The treatment necessary for the removal

of the water from the tissues previous to mounting in balsam is such that many portions of embryonal and delicate structures are shrunken, distorted, and frequently almost completely destroyed. In this drawing the enamel-pulp, an exceedingly delicate tissue, is so nearly

Fig. 14.

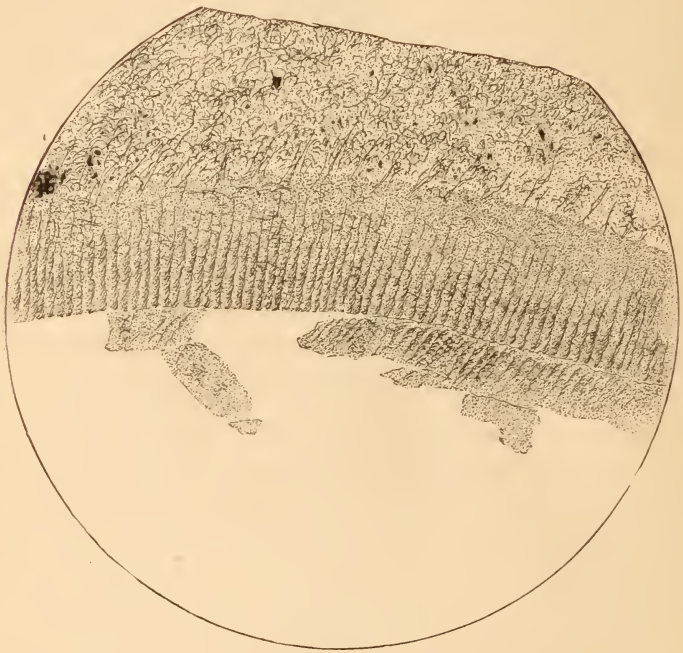
obliterated as to have little or no significance. The author says, in speaking of the space shown between the dentine and enamel, that it appears in my drawing, and that all good sections show it. Is a "good" specimen one in which all of the tissues are shown in an undisturbed relation? If so, then no good section shows such a

space. It is shown in the drawing referred to, because in all of my drawings I have endeavored to faithfully reproduce the specimen from which the drawing was made, and, where there are defects in the specimens, those defects have been reproduced and explained for the benefit of those who are to follow me in this line of investigation. We sometimes learn more from the failures and defects in our work than we do from our successes, if we but keep our minds open to the reception of truth, at the expense even of a little injured pride. I shall show you photographs and microscopical sections to-night in which these dental tissues are in an undisturbed relation, and where, previous to the commencement of the formation of either dentine or enamel, the dentine-pulp and enamel-pulp are in perfect contact, and also specimens where the first faint lines of dentine and enamel have appeared, and these lines of dentine and enamel in perfect contact, with the ameloblasts everywhere plainly shown above the enamel. In all of the sections which I have cut during the past year there is no appearance of a space between the dentine and enamel until the section is placed upon the slide and the cover-glass pressed down. Then the pressure quite frequently forces the tissues slightly apart. The second illustration of tooth-structure in this reprint is represented as a portion of the previous section more highly magnified (Fig. 15). There is no appearance of an enamel-pulp in this drawing, and what is intended to represent completely-formed enamel is really in the position occupied by the ameloblasts. Below these cells there are probably in the original section a few fragments of the broken and torn enamel. This specimen, as I infer from the text, was submitted to the aforementioned expert microscopist, who returned the following comments:

"A microscopic study of the section of embryonic tooth you sent me discloses the existence of a space between the dentine and enamel. At the base of the enamel, *i.e.*, the surface of the enamel-rods next to the dentine, there exists an apparent line or membrane. Below this line or membrane is a somewhat homogeneous or colloid-looking substance, evidently of much less consistence than the structure above. Above this line is the enamel more fully developed and already hardened." After stating that the supposed line or membrane was an optical delusion, due to angular displacement of the softer portions of the enamel, he further says: "The enamel is formed on the dentine, and develops and becomes indurated as it is elevated by the development of new structure below, precisely as in the case of epidermal cells. I believe the teeth to offer no exception

to the general physiological law, and consider the doctrine which teaches that enamel is formed upon the dentine and grows by deposits from above as erroneous as the announcement that a membrane or line exists in the middle of the enamel-rods." Well, shades of Leeuwenhoek protect us! Such a complete misinterpretation of anatomical structure and physiological action can only find a parallel in the ancient doctrine of the "primitive dental groove."

Fig. 15.



After stating that there is a space between the dentine and enamel, in which space no structure of any sort appears, and which, in the developing tooth is a closed cavity surrounded on all sides by solid walls of dentine and enamel, he proceeds to tell us that enamel is formed in that cavity. But how formed, and from what? He says it is formed at the surface of the dentine and pushed upward from below. There is indisputable evidence in the structure of enamel that it is formed from prismatic cells. But there are no cells within this space or closed cavity. It can hardly be possible that the writer did not know that there can be no formation of tissue without proliferation of cells or corpuscles. In the formation of other epi

dermoid structures there is a constant cell proliferation from beneath. But no eye ever beheld the enamel-forming cells, in a section in which the tissues were in their natural relation, below the enamel and between the tissue and the dentine. They are always above it. After quite a lengthy quotation from Dean's translation of Legros and Magitot, the author of this reprint discloses the fact in a single sentence that he has never seen a well-mounted section showing a developed tooth. After referring to the analogy between the lower layer of cells of the enamel-organ and the prismatic cells of the intestines, he says: "It is one more point in favor of my position, that the enamel is not built by deposits from above, but pushed upward by a multiplication of cells from below." It is much to be regretted that he ever made this statement, for it is certainly destined to bring upon him the most intense humiliation.

You have now upon the screen (Plate II., Fig. 11) a photograph of a section of the jaw of a kitten at birth. The section, while representing an advance beyond those in which the "primitive dental groove" was so well portrayed, yet contains imperfections which make it of value in explaining some of the errors into which previous writers upon this subject have fallen. At the lower part of the view and rising upon either side is seen the inferior maxillary bone in transverse section. In the inferior parts of the bone is seen the medullary canal containing the nerves and blood-vessels. You will observe the very large proportionate size of the inferior maxillary nerves as shown in cross-section. Rising immediately above this, and occupying the larger part of the interior of the jaw, is shown the developing temporary tooth, to the side of which is seen the permanent tooth-germ. The cap of dentine is seen surmounting the pulp entire. But the thin line of enamel has been torn from its connection with the dentine and broken into fragments. Fortunately, however, while the space which it bears explains the space in Figs. 14 and 15, yet the structure of fully-formed enamel with the characteristic wavy lines, which nearly always run diagonally across each other at the tips of the cusps, is plainly seen in the lower side of these fragments, while the enamel-forming cells are clearly shown above. But a little further down on the side of the developing tooth the tissues remain in their natural relations, giving a perfect refutation of the hypothesis taught by Prof. Garretson and others. First, we see the tissue of the pulp surrounded by the layer of the odontoblasts; next, the band of formed dentine upon which a thin line of enamel has been deposited. Above this narrow line of

enamel are seen the ameloblasts, and outside of these cells the flat layer forming "Nasmyth's membrane," and further beyond the enamel-pulp. That there may be no shadow of doubt about the position of these enamel-forming cells outside of the formed enamel, I have slightly torn the tissues at this point in several specimens (Plate I., Fig. 5, and Plate II., Fig. 13), so as to show the isolated ameloblasts, the characteristic shapes of which, once seen, will never be forgotten. The next view (Plate I., Fig. 4) is a photograph under high power, taken low down on the left side of Fig. 11 (Plate II.,), where the enamel has just commenced to be formed.

It would not seem as though any further demonstration in support of my views could be asked for. You observe at the lower part of the view the dentine pulp surmounted by the odontoblast layer, above which a line of dentine has been formed, and upon the dentine a very thin layer of enamel has been deposited. Then come the ameloblasts, or enamel-forming cells, in intimate relation with the enamel-organ. We will project several more views upon the screen in further demonstration of this point. These photo-micrographs are from sections of both temporary and permanent teeth (Plate I., Figs. 5–7). Plate I., Fig. 8, is a more highly-magnified view of the lower part of Fig. 11, Plate II. It shows the medullary canal with nerves and blood-vessels. Observe the size of the inferior maxillary nerve and its tripartite division.

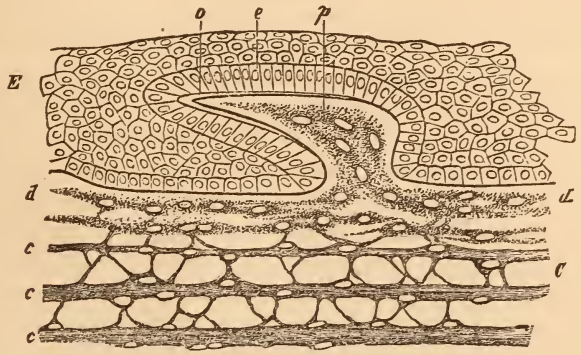
I think the most skeptical of my hearers must now be thoroughly convinced that the development of enamel is from the line of its union with the dentine outwards. Concerning the exact manner in which the formation of the enamel takes place, I cannot speak authoritatively. In every phenomenon of physiological activity there will probably always remain a deeper depth which the human mind cannot penetrate.

The fact, as I have before stated, that there can never be seen but a single layer of enamel-forming cells surmounting the enamel, leads naturally to the inference that amelification occurs by a secretion and deposit from these cells, and that, as the ameloblasts recede before the advancing formation of enamel, the fibre of the enamel-cell, which can plainly be seen projecting from the lower part next to the line of formed enamel, remains as the persistent fibre of living matter which Dr. Bödecker has so ably demonstrated as forming an essential feature in the histology of enamel. It is also possible that the formation of the enamel may be by an intercellular deposit and gradual elongation of the cell upward.

It is not true, as asserted by certain writers, that this method of the formation of enamel finds no parallel in epidermoid structure.

The process of the development of the placoid scales of the Elasmobranchii is almost identical with that by which teeth are formed. I quote from Hertwig and Balfour, than whom there are no better authorities in the world on this subject, who say, in speaking of these placoid scales, "They consist, when fully formed, of a plate bearing a spinous projection. They are constituted of an outer enamel layer on the projecting part, which is developed as a cuticular deposit of the epidermis (or epiblast), and an underlying basis of dentine (the lower part of which may be osseous)," corresponding, you see, with the cementum of the tooth, "with a vascular pulp in its axis."

Fig. 16.



The view on the screen (Fig. 16), of a vertical section through the skin of an embryonic shark, showing the development of one of these scales, might easily be mistaken for a developing tooth.

This brings us to a specific consideration of that "general physiological law" under which the development of the teeth and other epidermoid structures takes place. The author of the paper under review studiously, or possibly innocently and "without malice aforethought," avoided all mention of a very important group of the derivatives of the epidermis. We shall see that there may be endless departures from the modifications of that which is somewhat ambiguously spoken of as a "law" in the evolution of tissues. Now, those epidermoid structures of which mention has been made originate as local growths of the outward skin in an outward direction. The slight infolding of the columnar layer of the epidermis always maintains its relations with the adjacent cells of this layer around it.

The glandular group of the epidermic derivatives, of which no mention is made, originate as local growths of the outer skin in inward direction. They are characterized in the formative stage by a dilatation of the end of the ingrowing tube or cord of the epithelium from which the glandular part of the organ is developed. To this group belong the sweat and sebaceous glands, the tear glands, and the mammary glands. The formation of the enamel-organ of the teeth, while not identical because of its slightly different functional purpose, very closely resembles the development of the skin glands. It was my observation of this fact which first led me to regard it as essentially glandular in its nature. Its process of growth in the early formative stages is the same. While the appendages which are outward growths begin as a shallow pouch or pocket in the outer skin, the development of the enamel-organ and the glandular organs begins as an epithelial cord which descends by a more or less tortuous course deeper into the dermal tissues, enlarging at the lower end. In the case of the enamel-organ, this epithelial cord is severed from its connection with the external skin layer shortly after the commencement of the formation of the dentine pulp. The cord is completely broken up and disappears, and the enamel-organ exists as an independent body having no connection with the external skin layers. This one fact completely demolishes the argument of my critics of similarity or "general physiological law," for the hair pouch always maintains its connection through the outer and inner root sheaths with the external skin layer. Another proof of the glandular nature of the enamel-organ is, that if it be removed in the early stages of the formation of the teeth, as can easily be done in the jaws of a calf, it will be found to be highly impregnated with lime-salts, which are being elaborated for the building up of the enamel. After the completion of the enamel at the tips of the cusps of the teeth, the enamel-organ at that point is thus exhausted, but still remains lower down on the sides of the tooth, where the deposit of enamel is not yet completed, until its perfect work is accomplished, after which it entirely disappears. The development of a tooth, then, is a modification of the methods by which both groups of the epidermal derivatives are formed.

The evolution of the enamel-organ is a modification of the process by which the skin glands are developed. Unlike the formations of either group, it is developed in a closed sac which has no connection with the external skin layer. Later on in the process of development, and after the completion of the crown, the pericemental

membrane makes its appearance, probably originating as a transformation either of the cells which constitute the lower part of the cap of the enamel-organ, or of those which form the lower part of the investing capsule or tooth-sac, and the connection of the tooth with the external skin layer is again established through the pericemental membrane. The formation and growth of the cementum of the tooth is thus seen to be a modification of the methods by which the outward growth of the external skin layer is effected.

My reference to the formation of embryonal corpuscles in the transition of the prismatic cells of the cap of the enamel-organ into ameloblasts is spoken of as a kind of physiological necromancy, in which it is necessary to "wholly and completely set aside every law of nature." Well, this is not the first instance in the history of the world of men attributing to magic phenomena which they did not understand. If my critic has not watched the process by which a tissue returns to its embryonal condition, he certainly has much to learn concerning retrograde metamorphosis. This would hardly be the proper time for me to enter into a discussion of the processes of inflammation, but, so far as this wonderful and orderly provision of nature applies to the development of the teeth, I am quite well prepared to demonstrate everything which I have asserted. The photograph on the screen (Plate II., Fig. 9) is from a section cut just prior to the commencement of the formation of either dentine or enamel. In the earlier stages *preceding* this the columnar layer of cells is plainly seen at the lower part of the enamel-organ. But at this stage they have entirely disappeared, and from them there has been developed a sheet of round embryonal corpuscles. Those constituting the lower layer of this sheet are destined to develop into the ameloblasts proper, which, while somewhat resembling the original columnar layer, are quite different in many essential features, being club-shaped, or larger at the ends and constricted somewhat in the centre. This photograph (Plate II., Fig. 10) is from the side of a tooth somewhat more advanced in development. Enamel has just begun to be formed at the tip of the cusp or cutting edge. Further down on the side, in the region from which this photograph was taken, the enamel-forming cells are just developing from the embryonal corpuscles. The upper portion of this sheet of embryonal corpuscles is developed into the flattened layers known as Nasmyth's membrane, which is clearly seen in any well-mounted specimen. (See also Plate I., Fig. 4.)

Leaving this part of my subject, I call your attention to the

structure of that layer of cells surmounting the tooth-pulp, and known as the odontoblasts. You are all aware that Prof. Heitzmann and his pupils, Drs. Abbott and Bödecker, have represented these bodies as round or oval nucleated corpuscles, between which the dentinal fibrillæ pass. Dr. Abbott, I believe, has stated positively that the dentinal fibrillæ are direct prolongations of non-medullated nerve-fibres, and they are so represented in his chart. Dr. Bödecker has stated it as his opinion that there is a direct connection. I had long been perfectly satisfied in my own mind that they were holding erroneous views of the origin of the fibrillæ, but it was not until a few months ago that I succeeded in cutting sections so thin that but a single layer of odontoblasts was represented. These specimens have been examined by Prof. Heitzmann, Dr. Bödecker, and Dr. Atkinson. Prof. Heitzmann had hardly more than glanced at one of the sections, when, with that perfect frankness which is so characteristic of this noble searcher after nature's truths, he admitted his mistake. Subsequently, while examining this specimen under my 1-25 inch objective, he thought he could detect very delicate fibres passing between the odontoblasts. But it is certainly established beyond all question that the dentinal fibrillæ proper are prolongations of the odontoblasts. The discovery that there are frequently two and sometimes three fibres projecting from a single cell, and that these cells are connected at their base by roots or processes with the reticulum of the pulp, and the fact that the pulp itself is a form of persistent embryonal tissue, as shown by the researches of Heitzmann and Bödecker, led me to the conclusion that they are a form of ganglion cell. The photograph on the screen (Plate I., Fig. 6) is from the periphery of the pulp of a completely developed tooth. It is plainly seen that the odontoblasts terminate in fibres, and close examination reveals some of them dividing into two or three. But this point is so difficult of elucidation that I shall depend largely upon the sections under the microscopes for a perfect demonstration.

I have stated in my recent series of papers in the *Dental Cosmos* that, since the announcement of my discovery of the ganglionic nature of the odontoblasts, I have frequently been asked how I explain the formation of dentine. Do these cells perform a double use? Are they elements of sensation, and also for the elaboration of the dentine? It would seem to be almost a self-evident conclusion that the material for maintaining the continued integrity of the dentine must be provided by these cells, for the living matter (the fibrillæ) which fills the canaliculi is a prolongation of these cells, as we have

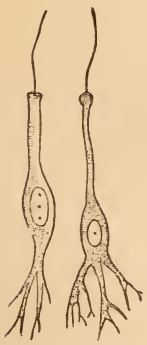
seen. If the supply of nutritive material for maintaining the continued integrity of the dentine comes from this source, why may we not logically infer that it was originally formed in this way?

A study of the physiological significance of the primary germinal tissues again finds practical application here.

We have seen that in many of the low forms of animal existence, the tissues of which are represented in higher forms while in an embryonal condition, where differentiation has made little progress, a multiplicity of function is performed by the same elements or cells. Pulp-tissue, therefore, being a persistent form of embryonal tissue, we should expect to find it performing a multiplicity of functions. The odontoblasts, while composed of what is essentially neural matter, are probably at the same time the active elementary agents in secreting the material for the formation and continued integrity of the dentine. Such instances of multiplicity of function are by no means rare in the lower forms of functioning bodies. In the myo-epithelial cells of Hydra, as seen in the view on the screen (Fig. 17), we have an instance of contractile fibres originating in epithelial cells. In the Protozoa there are found elements which perform the function of nerves and muscles at the same time. In the neuro-epithelial sense cells of Aurelia Aurita we have almost a perfect duplication of the odontoblasts. These are specially modified epithelial cells of the digestive tract. "They consist," says Balfour, "of an outward process which is prolonged into a fine hair, while their inner extremity terminates in fine processes which join a delicate network of protoplasmic fibres." One might easily mistake this for a description of the odontoblasts. (Fig. 18.)

Fig. 17.

Fig. 18.



Gentlemen, I hope I have made these matters plain to you, and I trust the contribution will prove, for the honor of the profession which I love, some slight addition to our rather scanty knowledge of an obscure subject. I also trust that in what I have said I have given no cause for offense. I have spoken earnestly and somewhat pointedly, because I could not but see that my critics seemed to hold the opinion that a knowledge which has grown out of the practical investigations of years could be brushed aside by a few hastily pre-

pared conclusions drawn from a superficial examination of inferior microscopical preparations. If they are willing to do the drudgery incident to this kind of work, and will go over the ground in the plodding manner that is necessary, I think we shall not be very far apart at the end. I now invite your attention to the exhibition under the microscopes, in which you will doubtless find the most interesting feature of the demonstration.

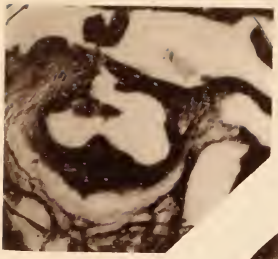
DISCUSSION.

Dr. Atkinson: The demonstrations that have been made before us show so clearly the justification of the interpretations which have been made of the mode of development of the tissues, by a very few who were willing to walk in the way of understanding obedience to the presence that revealed it to their minds in this investigation, that I wish to refer, somewhat in detail, to the clear demonstration of how the mistakes have been made in previous interpretations, and to display the folly of men attempting to collate from the recorded statements of other observers, without personal experience in making sections themselves.

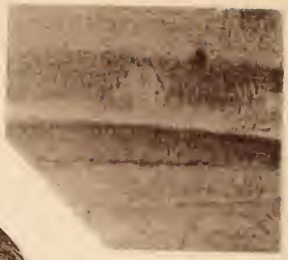
The history of how this came before us is a little peculiar. At the meeting of the New Jersey State Society at Asbury Park, Dr. Cryer presented me with his work which embodies his views on this subject. I characterized it to him as utterly erroneous and shameful for a teacher to present. His reply was this: "I was not sure that I was right, but I was determined to bring it before just such men as you, that if I were not right I might have the benefit of better intelligence than I possessed." I was induced to send a copy, of which he gave me three, directly to the essayist of the evening; and he informed me that the moment he received it the influence upon him was such that he could not do other than work faithfully in what he had been before convinced was the true path; and it is to these incessant currents of energy and study that have been so much decried by some who call themselves scientific *par excellence*, that we are indebted for what we have had.

I cannot find words to express my admiration for the manner in which the essayist has exposed the errors of those investigators who have taken advantage of their own mistakes and unskillfulness to prove their positions. He has shown how, in the pressing down of the cover-glass on the fluid in which the specimen is imbedded, they have separated tissues which should be joined.

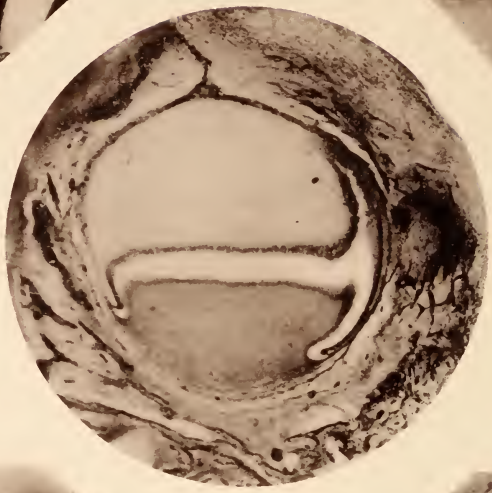
Plate I.



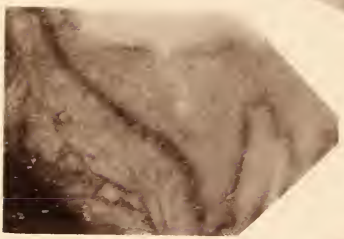
1



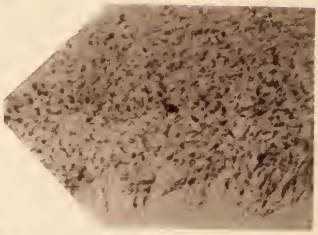
5



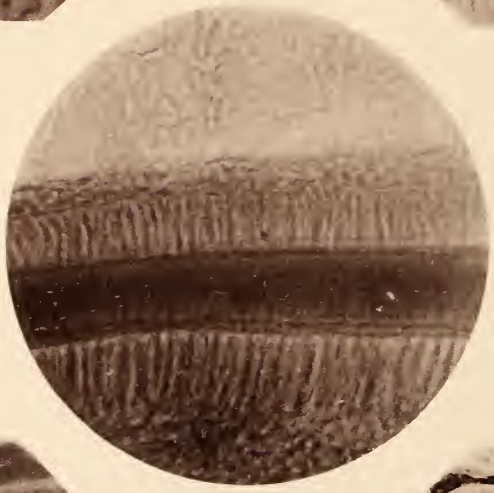
3



2

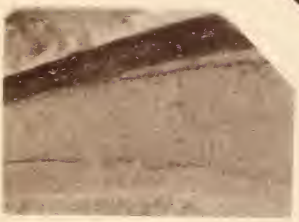


6



4

7



8

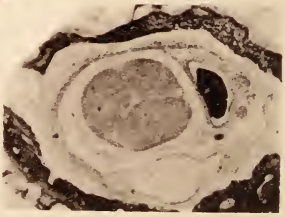
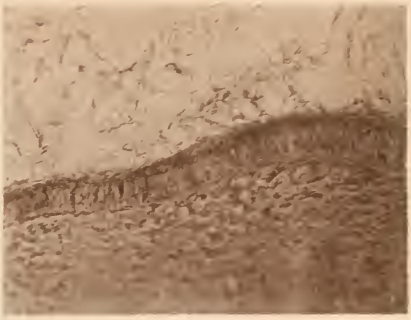


Plate II.

9

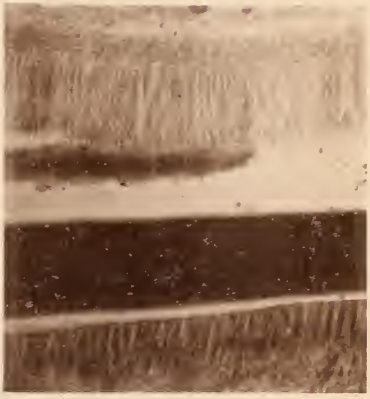


10

12

11

13



Dr. Rhein: As the chairman of Section V., I would like to place on record the thanks that I feel to be due to Dr. Williams for the admirable paper which he presented to us the other evening. He is a young man who is and has been for a great many years working with the microscope, and under the most adverse circumstances.

The President: The Chair would call the gentleman to order, and would suggest, in doing so, that it is not in order in discussing a paper to discuss the gentleman who is its author.

Dr. Rhein: I think everybody who heard the paper the other evening will bear me out in the view that it would not be out of place to say a few words in commendation of the author of the paper to which we listened.

Dr. Cushing: It is not in order to discuss the merits of the writer of a paper. If we are discussing a paper we should confine our discussions to it.

The President: I think the point is well taken, and that the gentleman should discuss the subject under consideration, and not the writer of the paper.

Dr. Rhein: If the Chair refuses to hear the report of Section V., I retire.

Dr. Abbott: Unfortunately for me, I was not present the other evening to listen to this paper, but there are one or two points in it that I want to speak of particularly, because they differ from what seems to have been the prevailing opinion of a few of us in New York previous to this time.

I would premise my remarks by saying that some one, I do not know who, said in Dr. Williams's hearing that the ground he had gone over was almost the same that Dr. Black had been over. I would state, in justice to Dr. Williams, that he has been over the same ground that Dr. Black went over; and that he was inspired to do so from seeing what Dr. Black had done; but he had no idea of detracting one single iota from anything Dr. Black has done.

I will state some points in which he claims priority. The first is the development of ameloblasts immediately under the flat layer of epithelial cells, which eventually forms over the crown of the tooth Nasmyth's membrane; the columnar layer of cells that was there when the enamel cap was first formed disappearing entirely, and what are called the enamel-formers, or ameloblasts, forming in their place, and the flat layer of cells which eventually forms Nasmyth's membrane, covering it up,—this, he claims, is his individual discovery. The next is, as shown by his first view, a section of the entire tooth

cut through longitudinally, showing the interdental tissues with the surrounding tissues in continuity. The next is the development of the dentinal fibres as branches from odontoblasts, several coming from one odontoblast. You who have read the article of Dr. Bödecker upon this subject will remember that he claims that, instead of the dentinal fibre starting out at the end of the odontoblast, and passing on into the canaliculi of the dentine, the non-medullated nerve-fibre runs from the pulp up between the fibres of the myxomatous tissue, going to the odontoblasts themselves, there becoming a part of the wall of the odontoblasts on either side, and then passing up between the ends of the odontoblasts, and so on, forming the dentinal fibre. Tomes's idea formerly was that the odontoblasts started off like links of sausage, something as Dr. Williams's illustration showed; and the point running out from the end was known as Tomes's dental fibre. Dr. Bödecker took the opposite position,—viz., that the dentinal fibres passed out between the odontoblasts; and I must confess that in the examination of many specimens I have seen exactly the same thing, and it was seemingly as plain as my hand is to you to-day. I have not seen the specimens of Dr. Williams's, but I have seen the drawings; and those drawings indicate but a slight difference from Dr. Bödecker's, so slight that it is not worth disputing about. He shows one, two, and sometimes three branches from one odontoblast, which penetrate the dentine and form the dentinal fibre. Now, we do not find the same form in every case. If we could have, in the same tooth even, in each mouth, a state of things in every case alike, it would be different. Then we could say that so and so is to be seen in certain kinds of teeth, etc. But instead of that you will find in every tooth varieties of particular things differing from others. The fact is, it is almost impossible to get two teeth that give us the same appearances; in fact, it would be difficult to cut two specimens from the same tooth, put them under the microscope, and have a view which would lead you to the conclusion that both were cut from the same tooth. I simply make these remarks to show that, no matter how carefully men may investigate and study this question, they will very often see things differently. I think we shall at no distant day arrive at a point, when no publication will be made of any histological work by any gentleman of a Section, without its having been carefully scrutinized by all the others of the Section, so that, when we present a paper here, we shall present it as a body, believing that we are right, and that we all see the specimens the same.

That is what we desire to do. In that way I think we can form a team to work which would have a better effect and influence than could possibly come from working by ourselves.

Dr. PEIRCE: I wish to say a few words in regard to the paper under consideration. I feel sorry that the gentleman who read the excellent paper gave so much importance to the views that had been advanced by Dr. Garretson and Dr. Cryer. It is well known to those who have studied the subject that in 1838 Mr. Goodsir published in England a very minute account of what he deemed the correct history of the development of the teeth; that is, that a tooth passed through three important stages, which he termed, first, the follicular stage, when the teeth were in this open groove; second, the saccular stage, when the groove closed; and third, the eruptive stage, when the teeth advanced and cut through the gums. He advanced the primitive dental groove theory in 1838, and for years it was the popular idea; but previous to 1868 Huxley and Magitot and others came to the conclusion that he was all wrong, and that the mistake which Goodsir had made was in the imperfect preparation of his tissues, or rather the imperfect manipulation of them; that he had wiped off the enamel cap, and left the dental groove. What I wished to express to you was that the views which Dr. Williams combated so skillfully were given more importance than they are entitled to, for they are not the results of the investigations of Garretson and Cryer, but were advanced by Goodsir, and have been entirely abandoned under the light of more recent investigations. These men were not original investigators: they had accepted those views simply because they had become familiar to them.

The work that has been done in this direction has not been easily done; and we in this country, as well as in England and on the Continent, have a proper appreciation, I think, of the credit due for the careful manipulation of material which has brought out the facts; and I know of no one who has pursued the subject more independently and faithfully than our friend Dr. Williams. I know of no one to whom greater credit is due for the results of his investigation. He has given us clearer ideas of the odontoblast and formation of the fibrillæ and tubuli than anyone else, I think, though his views are not widely different from those of others who have been over the same ground.

Dr. SPALDING: I did not understand Dr. Williams in his paper to consider it necessary to combat the old dental groove idea of Good-

sir. I understood that he merely made the explanation and exposition which he did to show the manner in which Goodsir and others were misled. I believe that was his object; because I am sure nearly every dentist in this country knows that that theory is pretty thoroughly exploded.

In regard to the layer of flat cells which lie in contact with the ameloblasts, that, I believe, is in accordance with what we know of the histology of other tissues. We know that the epidermic tissues are renewed from the layers below, and we know that the cells of the layers beneath are entirely different from the epidermic cells in form, and that conversion takes place whenever the cells from below rise and take the place of the epidermic cells. This case of the ameloblasts is in exact agreement with that idea.

Dr. Abbott: Only they are not reproduced; they do not wear off.

Dr. Spalding: That is a question,—whether they are reproduced. We have a great many instances where the ameloblasts are destroyed, or at any rate where they fail to perform their office, where there is a fissure or something of that kind, which is closed subsequently. Now, the question is, whether the fissure is not closed from the transformation of flat cells to produce new ameloblasts. How otherwise can it be closed? It must be done in that way or by the budding process, or by the generation of new ameloblasts from themselves in some way; and we have no evidence of that. Therefore, it is not unreasonable to suppose that this flat layer should supply the material for ameloblasts when there is occasion for it. That there is frequent occasion for it is seen in the many teeth defective as to enamel, which we so often see and which seem to be increasing on our hands.

STANDING RESOLUTIONS.

The following standing resolutions are in force at this time, August 1, 1885.

Resolved, That henceforth no person shall be received as a delegate who is in arrears for dues, or until he has paid to the Treasurer the full amount due at the time his name was dropped for non-payment.

Adopted August, 1874.

Resolved, That hereafter no dental college shall be entitled to representation in this Association that does not require a good English education as a preliminary qualification for its matriculants, to be ascertained by examination.

Adopted August, 1879.

Resolved, That in order to secure representation in this Association, dental colleges must, subsequent to October, 1881, require all students entering therein to take two full courses of lectures previous to coming forward for examination and graduation, and must also state these conditions in their next annual announcement.

Adopted August, 1880.

Resolved, That hereafter no society shall be entitled to representation in this Association that does not require its members to live up to the requirements of our Code of Ethics.

Resolved, When it comes to the knowledge of the Committee on Credentials that any applicant for membership is violating our Code, said applicant shall not be received, and all such applicants shall be referred by the committee to the societies whose delegates they are, and in no case shall this Association be compelled to treat with violations of the Code, except where the violator is a member of this body and has no membership in any local society.

Adopted 1881.

Resolved, That the Secretary be instructed to assign members who may neglect to make their own choice the Section in which they are expected to work.

Adopted 1879.

Resolved, That the reports of Sections shall be called by the President in consecutive order, beginning each succeeding year one number higher than on the preceding year.

1879	commencing	with	No. I.
1880	"	"	No. II.
1881	"	"	No. III.
1882	"	"	No. IV.
1883	"	"	No. V.
1884	"	"	No. VI.
1885	"	"	No. VII.
1886	"	"	No. I.

Adopted 1879.